George Best Belfast City Airport - Environmental Noise Directive - Round Two - Noise Action Plan 2013-2018

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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 Environment Minister in June 2010 and submitted, in summary, to the European Commission.

Given the range of noise management measures already in place at GBBCA, no new noise management measures were proposed in the Round 1 Noise Action Plan. However, GBBCA committed to a number of actions including working with the Northern Ireland Environmental Noise Directive Steering Group (NIENDSG) to assess the noise maps and other available data to set criteria for designation of Noise Management Areas and Quiet Areas and to carry out another Community Attitudes Survey similar to the survey conducted in 2003. The status with respect to these actions is set out in Section 2.3 of this Action Plan.

As required under END, a second round ('Round 2') of strategic noise mapping was undertaken in 2012[2] and Noise Action Plans have been 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. A detailed review of all consultation responses has been undertaken before finalising the Noise Action Plan.

[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.

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 the Directive 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[4].

Noise has the potential to affect health in a variety of ways. Auditory effects occur as a direct impact of the noise, such as hearing damage. Non-auditory health effects may be associated with exposure to environmental noise, such as cardiovascular and psychological health effects.

The Airport does not present any direct auditory risk to local communities, and occupational and passenger risk is well addressed through existing operational procedures. 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 designed to prevent and reduce noise impacts in order to prevent any potential health effects and to contribute positively to the quality of life and wellbeing of neighbouring communities.

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 EISER Infrastructure Fund. It is a regional airport serving a range of destinations, mainly in Great Britain and Ireland 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

[3] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:189:0012:0025:EN:PDF [Accessed 2 October 2013]
[4] http://www.noiseni.co.uk/index/effects_of_noise.htm [Accessed 18 September 2013]
[5] ERCD Report 0907, 2010. *Environmental Noise and Health: A Review,* [online] Available at: http://www.caa.co.uk/docs/33/ERCD0907.pdf [Accessed 2 October 2013]

2011, GBBCA catered for just over 2.3 million passengers, representing approximately 35% of the air traffic to and from Northern Ireland.

The agglomeration under consideration in this Action Plan is the *Belfast Agglomeration*. Covering an area of approximately 198 km^2, the Belfast Agglomeration encompasses Belfast and parts of the Lisburn, Newtownabbey, Carrickfergus, Castlereagh and North Down borough 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.

1.3 The authority responsible

The 2006 Regulations state that the *Competent Authority*[6] for drawing up action plans for *Major Airports*[7] 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, the ICAO sets standards and regulations for environmental protection. ICAO has adopted a set of principles and guidance constituting the so-called *Balanced Approach* 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);

[6] The other Competent Authorities as per the 2006 Regulations are the Department of the Environment (for industrial sources within agglomerations), the Department for Regional Development (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).

[7] 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.

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).

1.4.2 European

Directive 2002/49/EC (END)[8] 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.

Directive 2002/30/EC[9] establishes rules and procedures for the introduction of noise-related operating restrictions, such as the prohibition or limitation of the operation of the noisiest types of aircraft, at certain designated airports. GBBCA is designated as a 'city airport' under the Directive[10]. The ***Better Airports Package*** (forthcoming) proposes to repeal Directive 2002/30/EC and further harmonise and strengthen EU rules on aircraft noise management and assessment.

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.

Directive 2002/30/EC is transposed into UK legislation through the ***Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003***[11], which provide designated airports with additional powers to introduce operating restrictions.

UK government policy on aviation, including the management of noise, is set out in the ***Aviation Policy Framework*** **('APF')**[12]**.**

The APF considers the 57dB LAeq 16 hour contour as "the average level of daytime aircraft noise marking the approximate onset of significant community annoyance"[13]. However, the government acknowledges that "this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor

[8] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:189:0012:0025:EN:PDF [Accessed 2 October 2013]
[9] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:085:0040:0046:EN:PDF [Accessed 2 October 2013]
[10] 'City airport' shall mean an airport in the centre of a large conurbation, of which no runway has a take-off run available of more than 2 000 metres and which provides only point-to-point services between or within European states, where a significant number of people are objectively affected by aircraft noise and where any incremental increase in aircraft movements represents a particularly high annoyance in the light of the extreme noise situation.
[11] http://www.legislation.gov.uk/uksi/2003/1742/made [Accessed 2 October 2013]
[12] Department for Transport (DfT), 2013a. *Aviation Policy Framework*, [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/153776/aviation-policy-framework.pdf [Accessed 28 March 2013]
[13] DfT, 2013a, p.58

does it mean that no-one outside of this contour will consider themselves annoyed by aircraft noise"[14].

In addition, the APF expects airport operators;

"to offer households exposed to levels of noise of 69 dB LAeq,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 LAeq,16h or more. Where acoustic insulation cannot provide an appropriate or cost-effective solution, alternative mitigation measures should be offered"[15].*

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 LAeq, 16h or more"[16].*

Sustainable Aviation (SA)[17] 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')[18]***, the Department for Regional Development ('DRD') has a power to direct airport authorities to take action for limiting noise and vibration or mitigating their effect. The 1994 Order also makes a provision for GBBCA to provide facilities for consultation with its stakeholders.

A ***Planning Agreement*** between GBBCA and the Department, last revised in October 2008, contains a number of obligations and restrictions on the operations at GBBCA. GBBCA has submitted a request to the Department to vary the terms of its Planning Agreement under Article 40A(1)(a) of the Planning (NI) Order 1991. GBBCA has

[14] *Ibid*, p.58
[15] DfT, 2013a, p.63
[16] *Ibid*, p.63
[17] http://www.sustainableaviation.co.uk [Accessed 20 November 2013]
[18] http://www.legislation.gov.uk/nisi/1994/426/contents/made [Accessed 2 October 2013]

requested the removal of the Seats for Sale restriction[19] from the Agreement and the introduction of a noise contour control cap and other noise control measures.

The ***Aeronautical Information Publication (AIP)*** for GBBCA[20] 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[21] was published by the Department 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.

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.

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 LAeq, 16hr or more) and to offer acoustic insulation to households and noise sensitive buildings (63 dB LAeq, 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 the Department, last revised in October 2008, contains a number of 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 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.

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[19] No more than 2 million seats on scheduled flights to be offered for sale **from** the Airport in any period of 12 months

[20] EGAC Belfast/City, [online] Available at: http://www.ead.eurocontrol.int/eadbasic/pamslight-5E1B952A22ECCCA86F7F056A9EFB42A4/7FE5QZZF3FXUS/EN/AIP/AD/EG_AD_2_EGAC_en_2013-04-04.pdf [Accessed 21 May 2013]

[21] Department of the Environment (DoE), 2013. *Noise Mapping and Action Planning Technical Guidance – Noise from Airports*, [online] Available at: http://www.doeni.gov.uk/airports_noise_mapping_and_action_planning_technical_guidance_2013.pdf [Accessed 3 April 2013]

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

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

Lden 50 – 54 dB = 18.05 km^2, Lden 55 – 59 dB= 5.88 km^2, Lden >60 dB = 2.85 km^2.
Lnight 45 – 49 dB = 4.27 km^2, Lnight >50 dB = 2 km^2.

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

Lden 50 – 54 dB =17,536, Lden 55 – 59 dB=9,085, Lden >60 dB =1,339.
Lnight 45 – 49 dB =6,828, Lnight >50 dB =569.

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

Lden 50 – 54 dB= 38,151, Lden 55 – 59dB = 17,391, Lden > 60 dB = 2,720.
Lnight 45 – 49 dB = 13,159, Lnight >50 dB = 1,098.

1.8 Identification of problems and situations that need to be improved

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"*[22].

The methodology is as follows: airport operators should use the LAeq, 16hr indicator for prioritisation and should identify the total population affected by noise levels of more than 50dB LAeq, 16hr. 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[23].

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

[22] DoE, *op cit,* p.21
[23] *Ibid.*

(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 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 4. 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 the Noise Action Plan.

GBBCA recognises that people do not experience noise in an averaged 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[24]) which may better reflect how aircraft noise is experienced in different localities.

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 Noise Action Plan. The formal public consultation took place between 14 June and 9 August 2013. A detailed review of all consultation responses has been undertaken before finalising the Noise Action Plan.

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

GBBCA has in force a number of measures designed to prevent and reduce noise, its associated potential health effects and to engage with and support neighbouring

[24] 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/SA-Noise-Roadmap-Publication-version1.pdf [Accessed 20 November 2013]

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 4).

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:

Planning Agreement Measures

- 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
- Indicative noise contour to be agreed with DoE in line with the recommendations of Examination in Public (EiP) which reported in 2006.
- Install and operate an integrated noise and track keeping system

Voluntary Measures

Preventing and reducing air noise:

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

Noise monitoring and reporting:

- Monitoring and reporting on track keeping performance
- Publication of flight statistics and noise related data on the GBBCA website and 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 which is geared towards making a positive impact in its community and to be a key contributor to economic and social development. Initiatives are set out in Section 8.2.5.2 of the Action Plan but may be summarised under the following headings:

- **Community Fund –** from fines on flights outside scheduled operating hours. Since the inception of the fund in 2009, GBBCA have supported over 60 local community groups to the value of £135,000.
- **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*, and *Engineers Week*[25].
- **Employment and skills development –** through the Airport's comprehensive programme of work experience, tailored work placements and the recently launched High Fliers Apprenticeship Scheme.
- **Supporting health and wellbeing –** through the Community Fund and wider CR programme and partnering with local charities such as Action Cancer and Macmillan**.**
- **Stakeholder engagement –** through the Forum, Community Information Days, 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.

Over 2,000 salaried hours are dedicated to CR initiatives each year. 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.

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

Table 11 sets out the actions GBBCA intends to take in the next five years. At present there are no criteria or limit values for Quiet Areas. GBBCA awaits further guidance from the Department.

1.12 Long-term strategy

As stated previously, GBBCA has submitted a request to the Department 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.

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

The Action Plan will also be reviewed, and updated if necessary, following any major development which affects the noise situation or the designation of 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 also continue to be actively involved in the work of the 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.

1.13 Financial information (if available): 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, a number of performance indicators / evaluation metrics are set out in Table 11. GBBCA's performance against these indicators / metrics will be regularly reviewed internally and a report on progress will be delivered 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[26], 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 second action plan to be produced by GBBCA under END and 2006 Regulations. It covers the period 2013 – 2018 and is based on the results of noise mapping of aircraft operating at GBBCA in 2011 under the terms of the 2006 Regulations.

Annex V of the Directive 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, 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.

[26] 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 particular in built-up areas, in public parks or 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

The 2006 Regulations outline a number of stages to manage and where necessary, improve environmental noise. The first 4 stages 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)*[27]

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 Department of the Environment ('the Department') and published on the Northern Ireland Noise website[28] 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

[27] Agreed informally with the Department
[28] www.noiseni.co.uk

Environment 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*[29] ('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. In preparing this Action Plan, regard has been had to the 2013 guidance issued by the Department. This draft Action Plan was subject to a formal public consultation as detailed in Section 7 before it was finalised.

Status of Round 1 Noise Action Plan

Given the range of noise management measures already in place at GBBCA, no new noise management measures were proposed in the Round 1 Noise Action Plan.

However 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***

Criteria for the determination of Quiet Areas is yet to be determined. ***In progress***

- Undertake a further Community Attitudes Survey to evaluate the implementation and results of the Round 1 Noise Action Plan and which, along with the noise maps from the next mapping round, will form the basis for the next round of Action Planning.

Status: as set out in Section 8.2.5.4, a Community Attitudes Survey was carried out in the first quarter of 2013. ***Complete***

[29] DoE, *op cit*.

2.4 Scope of the 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 Round 2 Agglomeration which is defined as having more than 100,000 inhabitants.

2.5 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"[30].

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[31].

Noise has the potential to affect health in a variety of ways; some of which can be auditory and occur as a direct impact of the noise. Direct auditory effects usually result in damage to the ear, in particular, damage to the inner ear from intense and prolonged exposure. Such risks are usually 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.

There are a wide range of non-auditory health effects that may be associated with exposure to environmental noise, although the pathways and strength of association for these are not well understood and can vary between noise sources. These include cardiovascular and psychological health effects.

On the above basis, 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[32]. This Action Plan is designed to prevent and reduce noise impacts in order to prevent any potential health effects and to contribute positively to the quality of life and wellbeing of neighbouring communities.

[30] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:189:0012:0025:EN:PDF [Accessed 2 October 2013]
[31] http://www.noiseni.co.uk/index/effects_of_noise.htm [Accessed 18 September 2013]
[32] ERCD Report 0907, 2010. *Environmental Noise and Health: A Review,* [online] Available at: http://www.caa.co.uk/docs/33/ERCD0907.pdf [Accessed 2 October 2013]

2.6 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 estimates in terms of the reduction of 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 267,742 according to 2008 census data from the Northern Ireland Statistics and Research Agency (NISRA). Covering an area of approximately 198 km^2, the Belfast Agglomeration encompasses Belfast and parts of the Lisburn, Newtownabbey, Carrickfergus, Castlereagh and North Down borough 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.

3.2 Airport description

GBBCA is owned by EISER Infrastructure Fund. It is a regional airport serving a range of destinations, mainly in Great Britain and Ireland 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 2011, GBBCA catered for just over 2.3 million passengers, representing approximately 35% of the air traffic to and from Northern Ireland.

In 2011, GBBCA catered for 41,941 aircraft movements. A breakdown of the main types of aircraft operating at GBBCA in 2011 is provided in Table 2.

Figure 1: The Belfast Agglomeration and the location of GBBCA

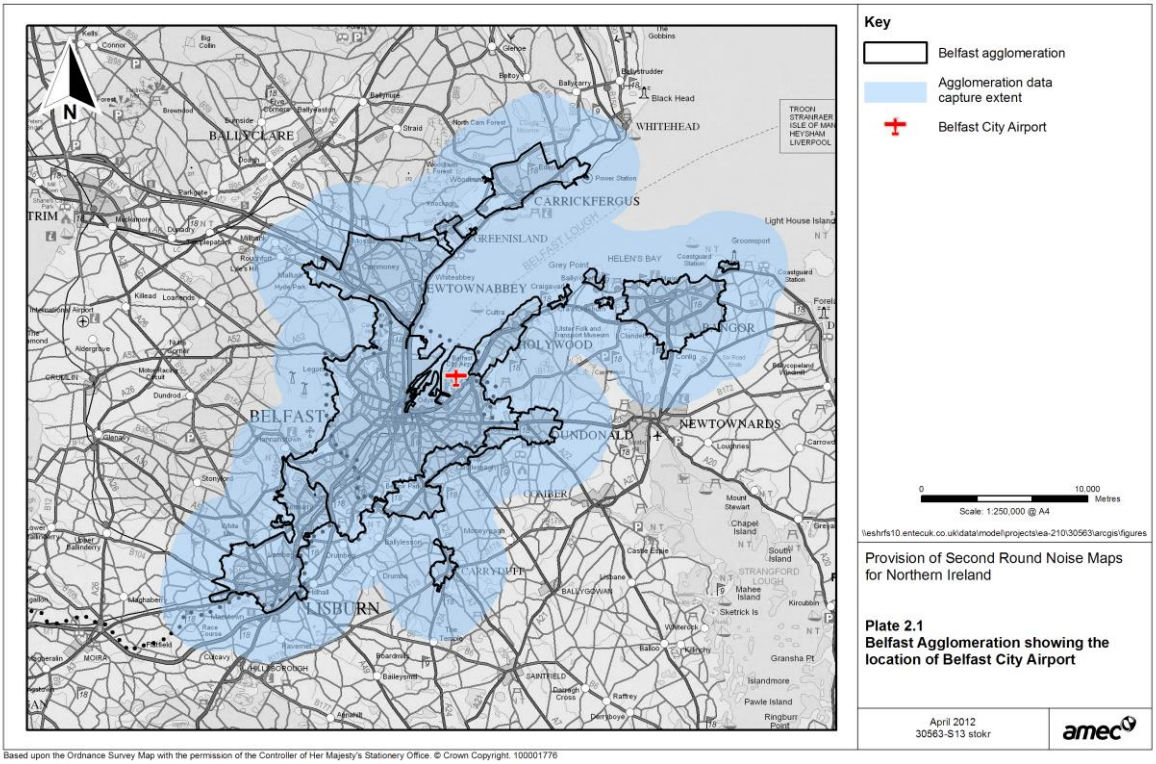


Table 2: Breakdown of 2011 movements by aircraft type

Aircraft Type	Number of Movements	% of Total Movements
Airbus A319/320	4,456	11%
Boeing 737	5,642	13%
Embraer 75/95	4,751	11%
Dash Q8-400	22,457	54%
Private/Other	4,671	11%

Although not meeting the threshold to be defined as a *Major Airport* under the Directive (i.e. having movements of 50,000 per year, excluding training or light aircraft) noise mapping had 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 040/222 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*[33] 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@belfastcityairport.com

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 of representatives from each Competent Authority including:

- Roads Service;
- Ports and Public Transport Division;
- Translink;
- George Best Belfast City Airport;
- Belfast International Airport; and
- The Department of the Environment.

[33] The other Competent Authorities as per the 2006 Regulations are the Department of the Environment (for industrial sources within agglomerations), the Department for Regional Development (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, the ICAO sets standards and regulations for environmental protection. ICAO has adopted a set of principles and guidance constituting the so-called ***Balanced Approach***[34] 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); and
    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.

In its ***Guidelines for Community Noise***[35] the World Health Organisation makes a number of 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. According to a report by the Health Protection Agency (HPA)[36] 50% of the UK population live in areas where daytime sound levels exceed those recommended in the WHO Guidelines for Community Noise.

5.2 European

Directive 2002/49/EC relating to the assessment and management of environmental noise[37] 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

[34] http://legacy.icao.int/env/noise.htm [Accessed 5 June 2013]
[35] Berglund, B., Lindvall, T. & Schwela, D., 2000. *Guidelines for Community Noise.* London: World Health Organisation.
[36] 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://www.hpa.org.uk/noise [Accessed 17 September 2013]
[37] For further information see the European Commission Environmental Noise Directive website: http://ec.europa.eu/environment/noise/directive.htm [Accessed 2 April 2013]

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[38] in 2012 and subsequent rounds. Action plans must be produced based on the results of the noise mapping.

Directive 2002/30/EC[39] establishes rules and procedures for the introduction of noise-related operating restrictions such as the prohibition or limitation of the operation of the noisiest types of aircraft at certain designated airports. GBBCA is designated as a 'city airport' under the Directive[40].

Under the European Commission's ***Better Airports Package***[41] (forthcoming), there is a proposal for an EU regulation on noise which would repeal Directive 2002/30/EC and further harmonise and strengthen EU rules on aircraft noise management and assessment. However, it is not expected for this new regulation to enter into force before mid-2014.

In its ***Night Noise Guidelines for Europe*** the World Health Organisation[42] 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 population live in areas where the night-time guidelines recommended by the WHO are exceeded[43].

5.3 National

Directive 2002/49/EC is implemented in Northern Ireland by the ***Environmental Noise Regulations (Northern Ireland) 2006 ('the 2006 Regulations')***[44]. 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.

[38] In the Regulations, the population density used is equal to or greater than 500 people per km^2.
[39] http://europa.eu/legislation_summaries/environment/noise_pollution/l28068_en.htm [Accessed 5 June 2013]
[40] 'City airport' shall mean an airport in the centre of a large conurbation, of which no runway has a take-off run available of more than 2 000 metres and which provides only point-to-point services between or within European states, where a significant number of people are objectively affected by aircraft noise and where any incremental increase in aircraft movements represents a particularly high annoyance in the light of the extreme noise situation.
[41] For further information see the European Commission Mobility and Transport website: http://ec.europa.eu/transport/modes/air/airports/ [Accessed 5 June 2013]
[42] 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 31 May 2013]
[43] 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://www.hpa.org.uk/noise [Accessed 17 September 2013]
[44] http://www.legislation.gov.uk/nisr/2006/387/contents/made [Accessed 13 June 2013]

The 2006 Regulations do not apply to noise caused by the person exposed to the noise, noise from domestic activities, noise created by neighbours[45], noise at work places[46], noise inside means of transport or noise due to military activities in military areas.

Directive 2002/30/EC is transposed into UK legislation through the ***Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003***[47] which 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* with the standards adopted by the ICAO Council and documented within Chapter 3 of Annex 16 of the standards.

At national level, UK government policy on aviation, including the management of noise, is set out in the ***Aviation Policy Framework*** **('APF')**[48]. The APF was published on 22 March 2013 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 replaces the 2003 ***Future of Air Transport - White Paper***[49], more generally known as the *Air Transport White Paper* ('ATWP'). The APF includes the government's overall policy objective on noise[50] and a number of measures to reduce and mitigate noise.

The APF considers the 57dB LAeq 16 hour contour as "the average level of daytime aircraft noise marking the approximate onset of significant community annoyance"[51]. 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"[52].

In addition, the APF expects airport operators:

> "to offer households exposed to levels of noise of 69 dB LAeq, 16h or more, assistance with the costs of moving"[53] and;

[45] 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.
[46] Noise at work is governed by the Control of Noise at Work Regulations (Northern Ireland) 2006
[47] http://www.legislation.gov.uk/uksi/2003/1742/regulation/2/made [Accessed 5 June 2013]
[48] DfT, 2013a.
[49] DfT, 2003. *The Future of Air Transport*. Norwich: The Stationery Office.
[50] 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, 2013a, p.57)
[51] DfT, 2013a, p.58
[52] *Ibid,* p.58
[53] *Ibid*, p.63

"To offer acoustic insulation to noise-sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63 dB LAeq, 16h or more. Where acoustic insulation cannot provide an appropriate or cost-effective solution, alternative mitigation measures should be offered"[54].

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 LAeq, 16h or more"[55].

Sustainable Aviation (SA)[56] 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 published a Noise Road-Map[57] which is a blueprint of 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 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.

5.4 Regional / Local

Under the ***Airports (Northern Ireland) Order 1994 ('the 1994 Order')[58]***, the Department for Regional Development ('DRD') 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

[54] *Ibid*, p.63
[55] *Ibid*, p.63
[56] http://www.sustainableaviation.co.uk/ [Accessed 20 November 2013]
[57] 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/SA-Noise-Roadmap-Publication-version1.pdf [Accessed 20 November 2013]
[58] http://www.legislation.gov.uk/nisi/1994/426/part/III?view=plain [Accessed 5 June 2013]

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.

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 the Department.

GBBCA has submitted a request to the Department 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[59] from the Agreement and the introduction of a noise contour control cap and other noise control measures. This Action Plan will be reviewed and revised, if necessary, to reflect any significant changes arising once this request has been determined.

The ***Aeronautical Information Publication (AIP)*** for GBBCA[60] 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 8.2.5.3).

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.

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 LAeq, 16hr or more) and to offer acoustic insulation to households and noise sensitive buildings (63 dB LAeq, 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.

[59] No more than 2 million seats on scheduled flights to be offered for sale **from** the Airport in any period of 12 months

[60] EGAC Belfast/City, [online] Available at: http://www.ead.eurocontrol.int/eadbasic/pamslight-5E1B952A22ECCCA86F7F056A9EFB42A4/7FE5QZZF3FXUS/EN/AIP/AD/EG_AD_2_EGAC_en_2013-04-04.pdf [Accessed 21 May 2013]

A Planning Agreement between GBBCA and the Department, last revised in October 2008, contains a number of 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[61] 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 of 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 LAeq, 16hr for the summer 92-day period[62] and include in the case of the 57 LAeq, contour both the area covered and the population living within it.
- Agree an indicative noise control contour with DoE (Planning) 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

6. Summary of the results of the noise mapping

6.1 Round 2 noise mapping process

Noise maps were prepared by AMEC Environment and Infrastructure UK Limited (UK) on behalf of GBBCA[63] and were based on aircraft movements during the calendar year of 2011 using the prediction methodology Integrated Noise Model (INM) Version 7.0b. 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.

[61] 'Air traffic movements' means landings or take-offs of all aircraft (except diverted aircraft).
[62] 16 June – 15 September
[63] AMEC Environment and Infrastructure UK Limited (AMEC) were commissioned by the Department of the Environment 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, AMEC have prepared noise maps, all associated population exposure data and supplementary reports as required under the 2006 Regulations and the Directive.

The noise mapping stages were as follows:

Stage 1 – confirm the methods to be used for mapping
Stage 2 – confirm the Round 2 mapping extents
Stage 3 – review Round 1 mapping
Stage 4 – confirm Round 2 datasets
Stage 5 – develop finalised noise model
Stage 6 –noise calculations
Stage 7 – post processing, analysis and quality assurance

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 a number of parameters relating to the average noise level in decibels (dB) over specific periods of time – as follows:

- Lday – annual average daytime noise level (07:00 – 19:00 hours)
- Levening – annual average evening noise level (19:00 – 23:00 hours)
- Lnight – annual night-time noise level (23:00 – 07:00 hours)
- Lden – annual average 24 hour noise level (day-evening-night) but with evening values weighted by 5dBA and the night values weighted by 10dBA

The maps were also produced for LAeq, 16hr (07:00 – 23:00 hours) as this is the primary parameter used by UK airports when mapping aircraft noise[64].

It is important to highlight the difference between how the annual LAeq, 16hr noise contours are calculated for END purposes, as compared to the LAeq 16 hr noise contours which are prepared annually for GBBCA in line with the Airport's Planning Agreement[65].

As shown in Table 3, the primary difference between the two is the Planning Agreement contours only take into account flights in the summer 92-day period (16 June – 15 September) and are based 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.

[64] DoE, *op cit*.
[65] e.g. Bickerdike Allen Partners, 2011. Belfast City Airport Airborne Aircraft Contours. A9443 R01 NW November 2011

Table 3: Comparison between END and Planning Agreement LAeq, 16hr contours

LAeq, 16hr 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[66]:	Average over year	Average over summer 92-day period

Consequently, the END and Planning Agreement contours for the LAeq, 16hr indicator cannot be directly compared. The thresholds set out in the APF in terms of LAeq, 16 hr 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
- 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 particular 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).

[66] See glossary in Appendix C

Table 4: Area exposed to GBBCA noise bands

Lden		Lnight		LAeq, 16hr	
Noise Band dB	Km^2	Noise Band dB	Km^2	Noise Band dB	Km^2
50-54	18.05	45-49	4.27	50-54	15.78
55-59	5.88	50-54	1.27	55-59	5.23
60-64	1.92	55-59	0.39	60-64	1.65
65-69	0.54	60-64	0.21	65-69	0.48
70-74	0.23	65-69	0.09	70-74	0.21
>75	0.16	>70	0.04	>75	0.14

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 are not entirely symmetrical. Contours to the north-east of the airfield are slightly to the north of the runway centreline as a result of 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).

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 parameters 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 and 2008 and 2010 estimates of population[67] from census data provided by the Northern Ireland Statistics and Research Agency. An estimate of the number of people per dwelling was generated by calculating the number of residential

[67] The 2008 population dataset is the last published dataset available for the 5022 detailed census output areas, while the 2010 population estimates provides information for the coarser 890 super output areas covering Northern Ireland. As such, an effective estimate of the 2010 population in each of the 5022 detailed census output areas needed to be developed for the final dataset to be used for the population exposure assessment. This was achieved by analysing the changes in population between 2008 and 2010 using the coarser datasets to derive an increase factor which could be applied to the detailed 2008 population data.

properties in each census area and dividing this value by the estimates of 2010 population in the census area[68].

The results of the population exposure assessment for GBBCA are set out in Table 5. This table shows the number of people within the contours for the various noise bands.

Table 5: Dwellings and population exposed to GBBCA noise

	Lden			Lnight			LAeq, 16hr	
Noise Band dB	**Dwellings**	**Population**	**Noise Band dB**	**Dwellings**	**Population**	**Noise Band dB**	**Dwellings**	**Population**
50-54	17,536	38,151	45-49	6,828	13,159	50-54	16,417	34,883
55-59	9,085	17,391	50-54	569	1,098	55-59	8,157	15,545
60-64	1,339	2,720	55-59	0	0	60-64	752	1,527
65-69	0	0	60-64	0	0	65-69	0	0
70-74	0	0	65-69	0	0	70-74	0	0
>75	0	0	>70	0	0	>75	0	0

6.5 Commentary on the results of population analysis

As shown in Table 5, there is no population exposed to noise levels of 65 L_{den} or above due to GBBCA. There are 2,720 residents exposed to 60 – 64 L_{den}, 17,391 residents exposed to 55 – 59 L_{den} and 38,151 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} noise levels of 55 dB or above due to GBBCA.

6.6 Comparison between Round 1 and Round 2 results

There are a number of 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 1 (2006) and Round 2 (2011) noise contouring exercises, it is necessary to examine how changes in the various data inputs could affect the overall results. A number of changes to key inputs have been identified – as follows:

- INM[69] version used (INM version 6.2a was used for Round 1 while INM version 7.0b was used for Round 2)

[68] One limitation of this method is that the pointer data might not identify all of the residential properties, for instance if a residential property is located above commercial premises. As a result, the methodology is reliant on the accuracy and currency of the Pointer dataset and the classification of the type of building.

[69] Federal Aviation Administration (FAA) prediction methodology, the Integrated Noise Model.

- adjustments to aircraft emissions (noise) assumptions in the INM to reflect actual noise of aircraft as measured (2011) vs. use of standard emission assumptions in the INM (2006)
- changes in modal split[70], aircraft fleet mix or aircraft movement numbers
- changes to population within the area under consideration
- variations in modelled airspace around the Airport and the dispersion of aircraft
- dwelling identification methodology (10m grid calculations vs. interpolated grids)

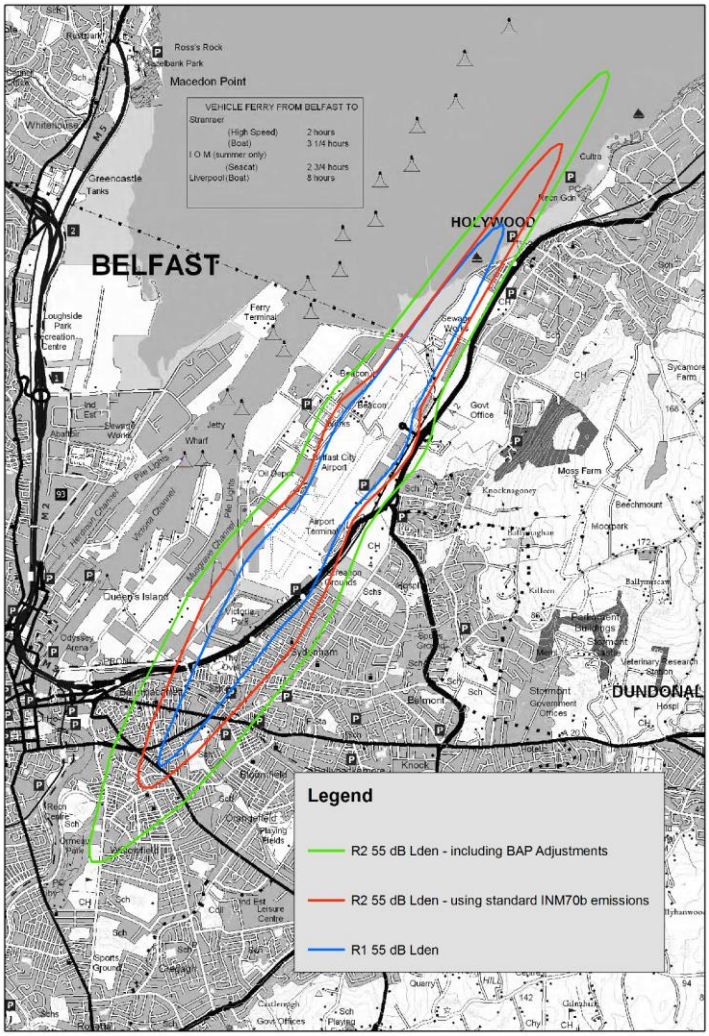
The above changes have been examined in more detail by AMEC to identify if the effect of any of the changes were considered to have significantly influenced the size of contours/population exposed to aircraft noise from GBBCA between mapping rounds. From their assessment, AMEC have identified two key factors responsible for changes in the overall size of the noise contours from Round 1 to Round 2.

The first and most significant of these factors is the adjustments made to the INM standard aircraft emissions assumptions using measured noise data. The Airport's Noise and Track Keeping System (NTMS) was not operational when the Round 1 noise mapping exercise was carried out in 2006 and as such the INM standard aircraft emission assumptions were used. However, the NTMS was operational when undertaking the Round 2 noise mapping exercise and it was therefore possible to use measured noise data to validate the standard INM assumptions to reflect the actual noise of aircraft operating to/from GBBCA.

The impact of using measured emissions data in Round 2 has been an increase in the size of the noise contours from Round 1 as shown in Figure 2 (for the 55dB Lden contour).

[70] See glossary, Appendix C

Figure 2: Comparison of R1 and R2 55 dB Lden with/without INM adjustments[71]



The second factor is the increase in number, and changes in timing of, aircraft movements in the Round 2 mapping period compared with Round 1. The main increases were in the evening and night-time periods, as shown in Table 6, which will have a greater influence upon the Lden contours due to the weightings of +5dB and +10dB respectively that are applied to the Leve and Lnight noise levels.

Table 6: Change in annual average movements between Round 1 and Round 2

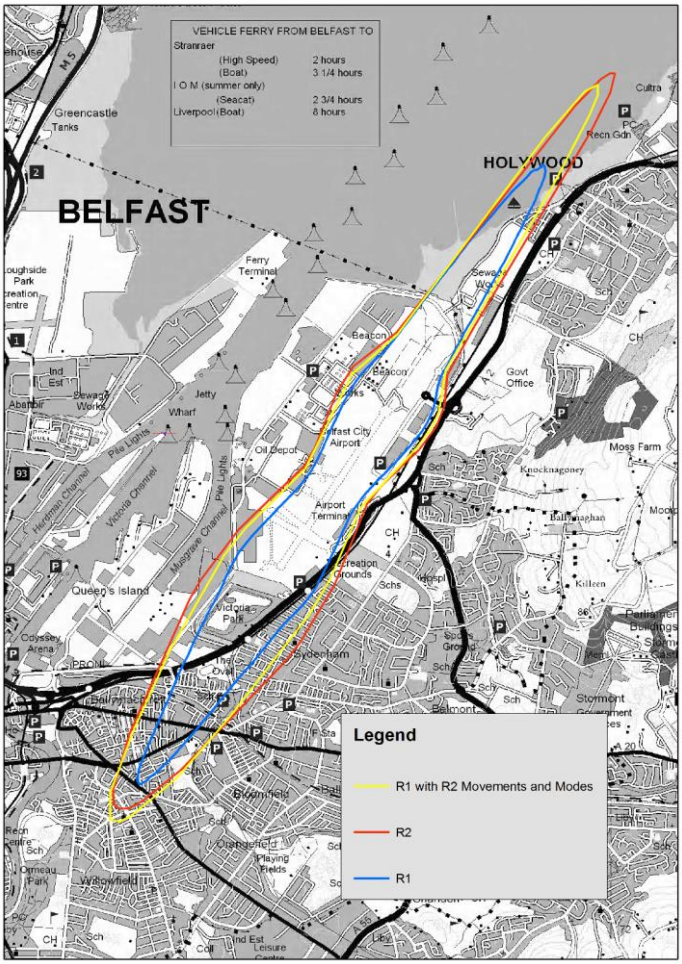
Round of Mapping	Day (0:700 – 19:00 hrs)	Evening (19:00 -23:00 hrs)	Night (23:00 – 07:00 hrs)
Round 1	90.9	15.3	0.6
Round 2	92.7	19.3	2.4
Change	**+1.8**	**+4.0**	**+1.8**

In order to evaluate the effect of the increased movements, the Round 1 model was "factored up" to reflect the movements in each period for Round 2 while keeping the

[71] BAP Adjustments in Figure 2 refer to the adjustments made to the INM standard emission assumptions to reflect the actual noise of aircraft operating to/from GBBCA as measured by the Airport's NTMS.

fleet mix, modal split and modelled airspace constant. This resulted in an increase in the size of the Round 1 contours as shown in Figure 3 below (for the 55 dB Lden contour).

Figure 3: Comparison of R1 and R2 55 dB Lden with R1 movements "factored up"



6.7 Noise sensitive premises

In accordance with the 2013 guidance[72], the Airport has identified the number of noise sensitive premises within the LAeq, 16hr contours for the various noise bands. Noise sensitive premises have not been specified in the 2013 guidance but GBBCA have applied DEFRA guidance for airport operators in England[73], and have assessed schools and colleges, hospitals and hospices.

As a first step, the relative exposure of education and health facilities were assessed by AMEC using the following steps:

[72] DoE, *op cit.*

[73] 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://archive.defra.gov.uk/environment/quality/noise/environment/documents/actionplan/airport-operators.pdf [Accessed 22 March 2013]

1. education and health buildings within Belfast were extracted from the OSNI large scale mapping datasets
2. a maximum LAeq, 16 hr and Lnight noise level was then assigned to each of these buildings
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 LAeq, 16 hr noise contour was provided by AMEC. This data was then reviewed by GBBCA in order to:

1. validate the current status of the education and health facilities (whether still in operation);
2. group buildings of the same facilities together; and
3. confirm facilities location as determined by AMEC.

GBBCA consulted a range of sources in order to validate education and health facilities including the Belfast and South Eastern Education and Library Board databases for schools, the Department for Education 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 were provided to AMEC for re-assessment and re-mapping within the noise contours in order to assign a maximum LAeq, 16 hour and Lnight noise level.

The results of the noise sensitive premises assessment are set out in Table 7.

Table 7: Noise sensitive premises exposed to GBBCA noise

Noise Band dB LAeq, 16hr	Schools / Colleges	Hospitals & hospices	Noise Band dB Lnight	Schools / Colleges	Hospitals & hospices
50-54	25	0	45-49	8	0
55-59	7	0	50-54	1	0
60-64	2	0	≥55	0	0
≥63	0	0			
Total	**34**	**0**	**Total**	**9**	**0**

The noise premises assessment identified that there are 34 schools / colleges exposed to 50 dB LAeq, 16hr or greater due to GBBCA. However, there are no schools / colleges exposed to 63 dB LAeq, 16hr 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 LAeq, 16hr or above due to GBBCA.

The restricted operating hours of the Airport also mean that no schools / colleges, hospitals or hospices are exposed to noise levels of 55dB Lnight or above due to GBBCA.

Although not of a level to qualify for noise insulation, GBBCA remains committed to 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.

7. Public consultations

In accordance with Article 8(7) of END, GBBCA carried out a public consultation exercise on its draft Noise Action Plan. The formal public consultation took place between 14 June and 9 August 2013.

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 Monday 17 June.

GBBCA also consulted with its Airport Consultative Committee (the Forum) on its draft Noise Action Plan at its meeting on 26 June.

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

- Belfast City Council
- George Best Belfast City Airport Forum
- Belfast City Airport Watch
- Cultra Residents' Association
- Department for Regional Development (Air and Seaports Branch)
- East Belfast Community Development Agency
- Holywood Residents' Association
- Park Road and District Residents' Association
- Resident in North Down (individual)

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 G.

8. Action planning process

8.1 Key stages of the action planning process

The action planning process includes a number of key stages – as follows:
1. Analysis of the strategic noise maps
2. Application of noise assessment criteria to identify Important Areas
3. Validation of noise levels experienced in Important Areas
4. Identification of Candidate Noise Management Areas
5. Identification of Formal Noise Management 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 Noise 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"*[74].

The methodology is as follows: airport operators should use the LAeq, 16hr indicator for prioritisation and should identify the total population affected by noise levels of more than 50dB LAeq, 16hr. 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[75].

Guidance has not yet been issued by the Department with respect to the approach for the determination of Quiet Areas in agglomerations.

[74] DoE, *op cit,* p.21
[75] *Ibid.*

8.2.3 Identification of Important Areas

As a first step to identifying where the top 1% of population exposed to greater than 50dB LAeq,16hr 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 8.

Table 8: Dwellings and population exposed at each 1dB from GBBCA noise

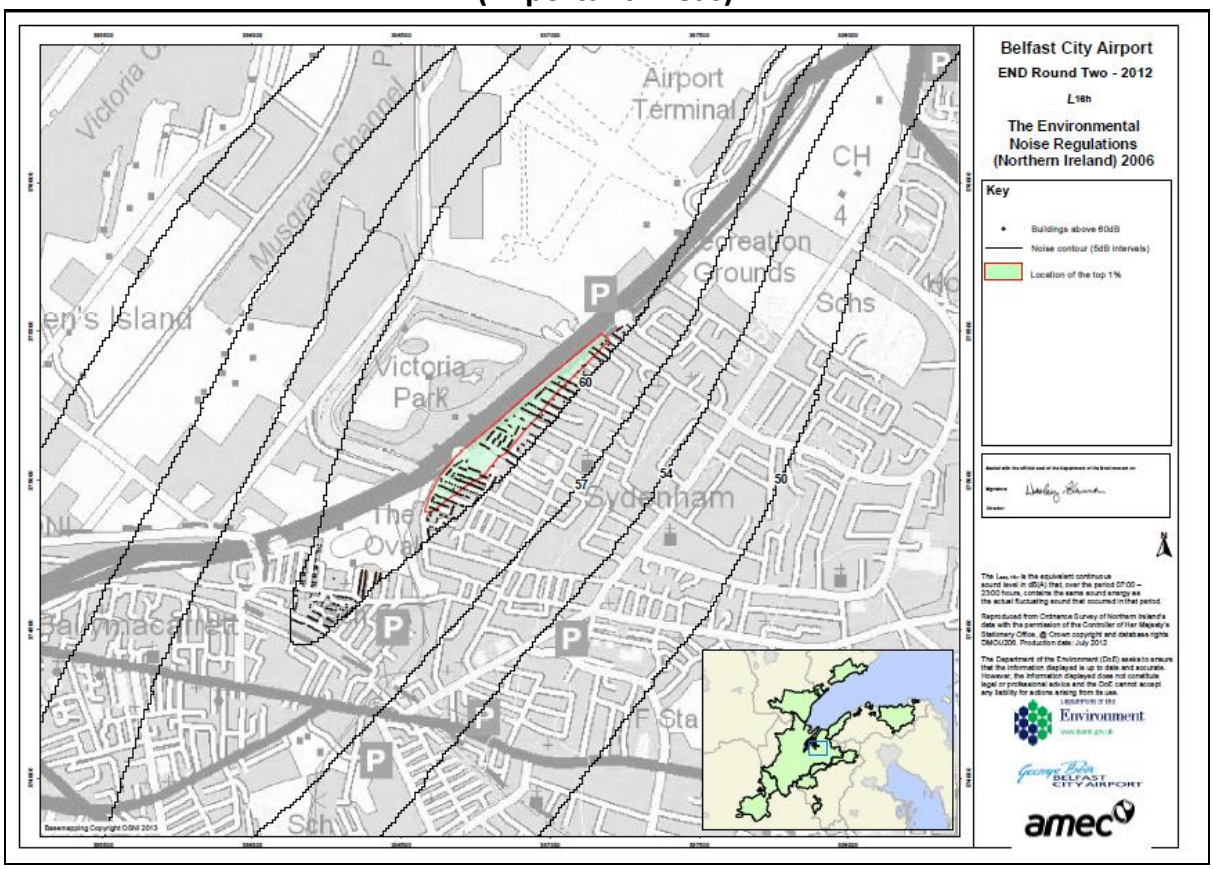
Min dB	Max dB	Dwellings	Population
50	51	3,433	7,880
51	52	4,209	8,968
52	53	4,289	8,629
53	54	2,286	4,938
54	55	2,203	4,475
55	56	2,550	4,905
56	57	1,799	3,499
57	58	1,533	2,787
58	59	1,228	2,365
59	60	1,038	1,970
60	61	560	1,166
61	62	175	328
Total		**25,303**[76]	**51,910**

Based on the numbers above, it is estimated that the top 1% of population exposed to the highest noise levels above 50dB LAeq, 16hr equates to 520 people or approximately 250 dwellings. This includes dwellings exposed to between 61-62 dB (175 dwellings) and some of dwellings exposed to between 60-61 dB (560 dwellings).

Dwellings above 60dB 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 4.

[76] This analysis has highlighted a small number of buildings within the 50 dB LAeq, 16 hr 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 Table 5 within this Plan.

Figure 4: 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 actually 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 monitors. 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 of these locations are within the 50dB LAeq 16hr noise contour.

Validation exercises were carried out by AMEC 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, AMEC compared the LAeq, 16hr outputs with those prepared for the 2011 summer 92-day period by Bickerdike Allen Partners[77] for GBBCA. When comparing the 57dB LAeq, contour for the annual (END) period and the summer 92-day period, for example, it was found that while the END contour was slightly larger to the south-west than the equivalent summer 92-day contour due to variances in the modal split between the summer and annual periods, 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 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[78]. 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"*[79].

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 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:

- 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 and 2013 Community Attitudes Surveys commissioned by GBBCA (8.2.5.4); and

[77] Bickerdike Allen Partners, *op cit*
[78] DoE, *op cit.*
[79] *Ibid*, p.14

- The relevant regulatory and policy framework and any limit values in place, as detailed previously (8.2.5.5).

8.2.5.1 Noise reduction measures already in force and projects in preparation

GBBCA has in force a number 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 4).

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.

Planning Agreement Measures

Restricted operating hours

a) Flights may only be scheduled to operate between 06.30 hours and 21.30 hours.
b) Delayed aircraft may be permitted to operate between 21.31 hours and midnight in exceptional circumstances.
c) 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 GBBCA Duty Manager for approval. The Airport maintains a log of extensions to the opening hours and supplies a copy of this log to DoE (Planning) on a regular basis.

GBBCA make considerable efforts to manage, the number of delays after 23:00 hours, in particular, as this represents the commencement of the night time period in the industry[80]. Less than 4% of delays outside scheduled operating hours were beyond 23:00 hours in 2012 and less than 3% of total delays in the year 2013 (to end November).

The restriction on GBBCA's operating hours is a key measure to help to address potential health effects associated with sleep disturbance from aircraft noise.

[80] 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, 2013b, p.25. *Night Flying Restrictions at Heathrow, Gatwick and Stansted – Stage 1 Consultation*, [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66837/consultation-document.pdf [Accessed 2 October 2013]

Movement limit

- No more than 48,000 air transport 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

- 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 International Civil Aviation Organisation Council would be allowed to operate.

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 standards adopted by the ICAO Council and documented within Chapter 3 of Annex 16 of the standards.

The prohibition of marginally compliant aircraft was embodied 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, the majority 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
• Embraer 195
• Dash-8 Q400 series
• SAAB 340B

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.

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 LAeq based on summer 92 day period, and include in the case of the 57 LAeq 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 Noise Monitoring Terminals (NMTs). This report quantifies and maps the area within the contours for the various noise levels (57, 60 & 63 LAeq, 16hr dB) as well as the population exposed at each level. The report is lodged with the Department and DRD 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 the Department 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 LAeq, 16 hr 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 (completed 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 Department (DoE) and the Department for Regional Development (DRD), in consultation with the Forum. The NTMS monitors and records the noise levels from aircraft movements and the tracks flown.

The noise data is 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.

Over the last number of years, GBBCA has been working with the Forum, in particular through the Environmental Sub Group, to determine what information would be appropriate and meaningful to extract from the system for the benefit of stakeholders, including the local community.

<u>Voluntary Measures</u>

<u>Preventing and reducing air noise</u>

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 and these penalties are over and above Community Fund penalties.

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 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 Takeoff 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 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.

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 effect a safe landing. For departing aircraft, these measures will assist in minimising the noise impact.

These are published procedures in GBBCA's AIP. They are also verbally reinforced to aircrew by Air Traffic Control.

Noise monitoring and reporting

Monitoring and reporting on track keeping performance

In response to a request from the Forum's Environmental Sub Group, GBBCA invested circa £10,000 in an upgrade to its NTMS to enable automatic detection of non-conformances of the Airport's noise abatement procedures and a reporting tool for non-conformances. The initial update took place in September 2011 after which time GBBCA entered into a calibration and testing phase. Over the following year, GBBCA made a number of modifications to the system following consultation with base airlines, other UK airports and a review of relevant guidance such at CAP documentation on airspace policy[81]. Final changes were made in November 2012 and from this time, GBBCA have been providing the airlines with regular reports on their conformance with the noise abatement procedures and have 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, percentage of flights over Belfast Lough and publishes this information on the GBBCA website on a rolling three month basis.

GBBCA also publishes the following 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
- Contact details for any queries or concerns relating to noise and other 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 4.

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 wherever

[81] Civil Aviation Authority (CAA), 2010. *CAP 778 Policy and Guidance for the Design and Operation of Departure Procedures in UK Airspace,* [online] Available at: http://www.caa.co.uk/docs/33/CAP778.pdf [Accessed 12 June 2013]

possible. The Airport also restricts the use of diesel powered Ground Power Units (GPU) where there is a serviceable FEGP available on stand, unless:

i) 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.
ii) 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 the prior approval by the Airside Standards Department and all engine ground runs are prohibited between 22:30 hours and 06:00 hours.

Engine grounds runs at GBBCA are restricted on the apron at *engine idle* setting to 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 GBBCA's Environmental Management System (last updated October 2013 and externally accredited to BS:8555 Phase 4).

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 Airside Standards Department.

8.2.5.2 Corporate Responsibility 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 a particular emphasis on supporting young people through strengthening relationships with schools and helping young people realise their aspirations through capacity building and skills development. A CR Action Plan in place and the CR team has overall responsibility for the development and implementation of this plan.

Community Fund

The Community Fund was launched in February 2009 with the aim of supporting the local community while reducing flights in and out of the Airport after 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 4), North Down and the greater Belfast area.

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

A formal application process and approval criteria was established in 2010 as well as a Community Fund committee within GBBCA to screen applications. GBBCA launched the new application process in August 2010 through its Community Information Days.

Since the inception of the fund in 2009, GBBCA have supported over 60 local community groups to the value of £135,000.

GBBCA also engages directly with local community groups to identify projects that can benefit from the Community Fund.

Supporting education

Although not of 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 the 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 and participating schools will be helped to become more efficient and business-like.[82] GBBCA currently has 3 adopted schools which are Victoria Park Primary, St Joseph's Primary and Mitchell House (Special Needs School). Specific engagement strategies for GBBCA's nominated Adopted Schools are agreed with each school principal at the beginning of school term.

[82]Source: http://www.bitc.org.uk/northern_ireland/what_we_do/place/raising_young_peoples_aspirations/adopt_a_school.html [Accessed 20 January 2012]

- **Time to Read:** 'Time to Read' is a paired reading programme developed by Business in the Community (BITC) in partnership with the local Education and Library Boards, to help improve literacy in local primary schools. It aims to engage business volunteers on a one-to-one basis with Key Stage 2 children to develop them socially and emotionally as well as enhancing their literacy skills[83]. Since becoming involved in Time to Read 8 years ago, GBBCA have dedicated approximately 900 salaried hours to the programme.

- **School visits:** GBBCA supports approximately 20 school visits per year accounting for over 160 man hours.

- **Engineers' Week:** During Engineering Week, GBBCA has facilitated visits from second level students, and engineering managers, delivered presentations and raised awareness of the opportunities for career development in the engineering and aviation sectors.

- **Educational events:** GBBCA continues to support educational events at the Airport for primary, post primary and third level students. Past events have included a workshop for primary school children with local authors and a presentation and tour with third level students from Belfast Metropolitan College Travel and Tourism programme.

- **Ad-hoc engagement:** with second and third level institutions (for example Queen's University Belfast, Belfast Metropolitan College and University of Ulster) to provide industry related information to curriculum based projects or short term work placements to facilitate applied learning

- **Community Fund:** GBBCA has supported projects to enhance outdoor play facilities or make environmental improvements at 7 schools in the vicinity of GBBCA to date. GBBCA also recently supported Cahoots NI to deliver its 'Lights, Camera, Math 'a' Magic' programme to 5 schools in its locality including two of its Adopted Schools.

- **Support in kind:** to improve the physical environment of local schools such as wall painting and tree planting in Victoria Park Primary School.

Supporting employment and skills development

GBBCA is conscious of the challenge faced particularly by young people, in securing employment in today's economic climate. GBBCA has a comprehensive programme

[83] Source: http://www.bitc.org.uk/northern_ireland/what_we_do/in_the_community/raising_the_levels_of_achievement_of_young_people/time_to.html [Accessed 20 January 2012]

in place to support employment and skills development in neighbouring communities. Initiatives include:

- **Work experience programme:** amounting to 35-40 students annually and providing 22 hours per week of meaningful work experience.

- **Tailored work placements:** linked with the STEM (Science Technology, Engineering and Mathematics) programme with the aim of promoting careers in these disciplines and for Windsor Women's Group in South Belfast to facilitate personal and professional development to enhance future career prospects. GBBCA has also supported the Graduate Acceleration Programme[84], by hosting a number of work experience placements for recent graduates within GBBCA's Communications and HR Departments in conjunction with Business in the Community.

- **High Fliers Apprenticeship Scheme:** launched in 2013, the scheme will provide up to ten participants between the ages of 16 and 24 with up to two years of work experience across a vast range of disciplines including Human Resources, Customer Service, Hospitality, Catering and Retail. The placements will be supported by training at the Airport in the areas of CV writing, job application writing and interview skills. Apprentices with be provided with a National Vocational Qualification (NVQ) and the opportunity to continue study or seek employment.

- **Silver Surfers:** GBBCA have on a number of occasions supported BITC's Silver Surfers programme to help over 50's across Northern Ireland with their IT skills. GBBCA employees have volunteered at local libraries to offer free IT taster sessions on Silver Surfers' Day.

Supporting health and wellbeing

GBBCA is committed to supporting the health and wellbeing of its staff and local community through its Community Fund and wider CR programme. Initiatives include:

- **Action Cancer Big Bus campaign:** In 2012, GBBCA supported Action Cancer's Big Bus campaign through its Community Fund. As part of the initiative, Action Cancer brought its mobile unit (the *Big Bus*) to GBBCA to raise much-needed awareness of the disease. Passengers, employees and members of

[84] GAP was launched in January 2010, with the objective of helping hundreds of Northern Ireland graduates gain six months of invaluable work experience whilst obtaining a postgraduate qualification that will help boost their employability and improve their career prospects. Source: http://www.gapni.com/about.aspx [Accessed 19 January 2012]

the public were able to benefit from the potentially lifesaving prevention and detection services on board.

- **British Transplant Games:** through its Community Fund, GBBCA supported the British Transplant Games that took place in Northern Ireland in August 2011. The event involved approximately 500 athletes, each of whom have received a life saving organ transplant, taking part in 20 sporting activities over a four day period. GBBCA employees formed part of the welcome party for athletes arriving into Belfast for the event as well as volunteering during the games.

- **Macmillan sponsored walk:** in August 2013, eight employees from GBBCA took part in an 8 mile walk with all sponsorship money donated to Macmillan Cancer. GBBCA sponsored each employee that participated[85] as well as providing mid-walk refreshments.

- **Les Jones Race:** In May 2012, hundreds of people including a number of GBBCA employees participated in the first GBBCA five mile road race. The race took place through the streets of East Belfast in memory of the late athlete Les Jones. The event received significant support from the Community Fund and was organised by Athletics NI.

- **Charity Days:** a charity day is organised twice a month for administration and management employees at GBBCA. Money raised from the employees taking part in this initiative goes to the Airport's charity partner, currently Macmillan Cancer. Macmillan provides support and assistance for people living with cancer and their families.

In total, over 2,000 salaried hours are dedicated to CR initiatives each year. 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, particularly in relation to education, employment, health and wellbeing.

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

[85] Up to £20 per participant.

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 the Airport 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 the Airport.

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 (the Chamber of Commerce, Northern Ireland Tourist Board, and Belfast City Centre Management), NI Consumer Council, Belfast Harbour Commissioners, and the Department for Regional Development.

Reports are prepared for the Forum on a rolling three month basis and circulated in advance of meetings: These are:

- Historical summary of aircraft movements after 21:30 hours
- Breakdown of aircraft movements after 21:30 hours by timeband and airline
- Percentage of flights over Belfast Lough
- Aircraft movements after 23:00 hours
- Aircraft movements by aircraft type
- Summary of noise complaints

The Forum has an Environmental Sub Group to enable more detailed consideration of environmental matters for example the annual Noise Contour Report. The Environmental Sub Group also 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.

- **Community Information Days**

GBBCA held Community Information Days in August 2010. Information and invites were sent to local residents via the Community Newsletter, through local media and through the Airport's social media channels. Representatives from the Airport (Community Fund, Environment, Airfield Operations, Airport Fire Service, Air Traffic Control and Planning) were available to chat to local residents regarding airport operations and to answer any queries regarding airport developments.

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

GBBCA regularly facilitates airport tours for local schools, community groups and political representatives on request. Representatives from GBBCA hold one-to-one meetings with local residents from time to time, to respond to specific issues

affecting their community or to facilitate information sharing relating to the Airport's operations. GBBCA also hosts an annual political breakfast where it briefs local politicians on issues that may be affecting their local constituents.

Communication on Noise Issues

- **Noise Complaints System**

GBBCA maintains a noise complaints system. Complainants may lodge complaints by e-mail, by letter or by fax, through a dedicated noise complaint telephone line or through the Airport's website. 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**

The GBBCA Community Newsletter is distributed quarterly to 24,000 residents in east and south Belfast and North Down. The newsletter contains information on those issues deemed to be of most importance to neighbouring communities, for instance, how to make a noise complaint and what the Noise and Track Monitoring System is as well as details on how to apply for Community Funding.

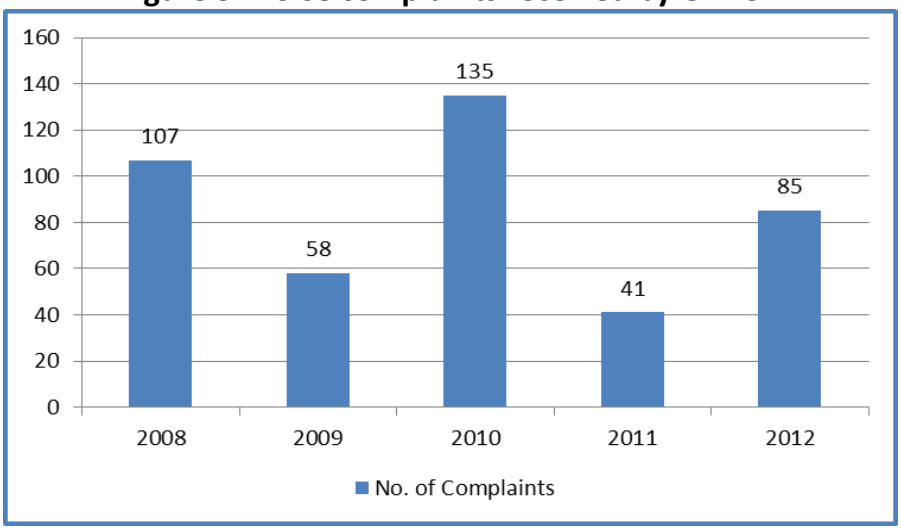
- **Social media**

In addition to its website, GBBCA are active across the social media platforms Facebook and Twitter, where the Airport regularly 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. The Airport have also held interactive community fund campaigns whereby the public could tweet using #communityfund and asking questions regarding funding.

8.2.5.3 Analysis of noise complaints received by GBBCA

Figure 5 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 since the Round 1 Noise Action Plan.

Figure 5: 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 approximately 6,000 per year.[86] [87]

Table 9 shows the top 6 areas where complaints regarding aircraft noise from GBBCA arise.

Table 9: Top 6 areas where noise complaints arise

Area	2008		2009		2010		2011		2012	
	No.	%	No.	%	No.	%	No.	%	No.	%
Kinnegar	5	5%	1	2%	2	1%	0	0%	3	4%
Holywood	6	6%	14	24%	9	7%	3	7%	15	18%
Cultra	17	16%	4	7%	14	10%	10	24%	10	12%
Ormeau / Annadale	23	21%	14	24%	35	26%	13	32%	24	28%
Stranmillis / Malone	3	3%	0	0%	5	4%	0	0%	10	12%
Sydenham / Ballymacarrett	32	30%	21	36%	45	33%	4	10%	7	8%
Other	21	20%	4	7%	25	19%	11	27%	16	19%
Total[88]	**107**	**100%**	**58**	**100%**	**135**	**100%**	**41**	**100%**	**85**	**100%**

Table 9 shows a fall in the number of noise related complaints arising from the Sydenham and Ballymacarrett areas (which encompass the top 1% as presented in Figure 4) over the last five years.

[86] http://www.belfastcity.gov.uk/noise/ [Accessed 14 June 2013]
[87] http://www.doeni.gov.uk/noise_complaints_statistics_report_2011_2012.pdf [Accessed 26 September 2013]
[88] Percentage totals may not exactly equal 100% due to rounding

8.2.5.4 Analysis of results from the GBBCA Community Attitudes Survey

In line with the commitments set out in the 2008 Noise Action Plan, GBBCA has commissioned a Community Attitudes Survey to follow up on a similar survey carried out in 2003. The purpose of the 2013 survey was to assess how attitudes have changed since 2003, to evaluate the effectiveness the current Noise Action Plan and inform future developments. For consistency, the 2003 survey methodology was closely replicated to enable like-for-like comparisons to be made between the two surveys. The 2013 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. The survey was conducted by an independent research consultant, MVA Consultancy. The survey period was 28 March–13 April 2013[89].

One of the objectives of the survey was to ascertain the degree to which respondents felt that aircraft noise had an adverse effect on their quality of life. Of the 17 indicators which were used in the 2003 and 2013 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 both the 2003 and 2013 surveys. Noise from aircraft remained less of a cause of dissatisfaction than many of the other quality of life factors, with almost 70% of respondents being 'very satisfied' or 'satisfied'. 4% of respondents indicated that they were 'dissatisfied' and a further 4% 'very dissatisfied' with aircraft noise.

Similarly, the number of respondents noticing aircraft noise was lower in the 2013 survey than in the 2003 survey. Noise from aircraft was noticed by 15% of respondents to the 2013 survey either 'all the time' or 'often' compared with 24% of respondents to the 2003 survey. 62% of participants in the 2013 survey responded that they 'never' or 'rarely' notice noise from aircraft (up from 46% in 2003).

While noise from aircraft was found to be 'very' or 'extremely' disturbing or annoying by 5% of respondents to the 2013 survey (decreasing from 11% in 2003), 90% of participants in the 2013 survey responded that they were either 'not at all' or 'slightly' bothered, disturbed or annoyed by aircraft noise whilst in their home over the last 12 months or so.

[89] The response rate to the 2013 Community Attitudes Survey was 8%. A sample of this size means a maximum confidence interval of +/- 4.83% at the 95% confidence limit. This means that if 50% of the sample indicated that street cleanliness is an important quality of life factor, then we can by 95% confident that between 45.17% and 54.83% believe that that street cleanliness is an important quality of life factor.

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 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.

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 4. 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 the Noise Action Plan.

GBBCA recognises that people do not experience noise in an averaged manner and will also give consideration to the need to employ any alternative measures (in line with industry best practice as set out by Sustainable Aviation[90]) which may better reflect how aircraft noise is experienced in different localities.

[90] Sustainable Aviation strategy and associated Noise Roadmap: SA, *op cit*.

8.3 Action planning programme of work

The action planning programme of work is set out in Table 10.

Table 10: 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	2013 – 2018
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 guidance issued by the Department on the designation of 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 11 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 to 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 11: Summary of actions GBBCA intends to take over the duration of the Noise Action Plan

Action	Timescales	Target (where relevant)	Performance indicator / evaluation metric	People Affected	Enforcement Authority (where relevant)
Preventing & reducing air noise					
GBBCA will continue to maintain restricted operating hours 06:30-21:30 with extensions granted up to 23:59 in exceptional circumstances	Ongoing	<2% per year operations outside scheduled operating hours	No. of flights outside scheduled operating hours as % of total flights	Residents and noise sensitive premises within Leve and Lnight contours	DoE (Planning)
GBBCA will continue to maintain the 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	DoE (Planning)
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
GBBCA will investigate the feasibility of introducing a Standard Instrument Departure for Runway 04 to enhance track keeping performance by airlines	Investigation commenced	Mid-2014	Report on investigation including cost benefit analysis to Environmental Sub Group % adherence to SID (if introduced)	To be determined	

Action	Timescales	Target (where relevant)	Performance indicator / evaluation metric	People Affected	Enforcement Authority (where relevant)
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 DoE (Planning)
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 LAeq, 16hr as per annual summer 92-day contours	Any future residents or noise sensitive premises within 63dB LAeq, 16hr	DRD
GBBCA will commence a review of noise insulation schemes at other UK airports to inform any potential future scheme at GBBCA (should it be required)	Commence January 2014	July 2014	N/A	N/A	
GBBCA will continue to review its 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*	Ongoing	N/A	Minutes of meetings	To be determined	

Action	Timescales	Target (where relevant)	Performance indicator / evaluation metric	People Affected	Enforcement Authority (where relevant)
Noise monitoring & reporting					
GBBCA will continue to operate and maintain its Noise & Track Monitoring System	Ongoing	N/A	N/A	N/A	DoE (Planning)
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	
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	
GBBCA will continue to publish flight and noise related statistics on GBBCA website	Ongoing	Monthly	Up to date flight and noise related statistics on GBBA website	N/A	
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 DRD and to Forum	N/A	DoE (Planning) & DRD
Preventing & reducing ground noise					
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)[91]	

[91] 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)
GBBCA will seek to maintain availability of Fixed Electrical Ground Power on its aircraft stands and promote its use by its airlines	Ongoing	To be considered	Number of airlines using FEGP Number of complaints relating to ground noise	Residents and noise sensitive premises within immediate vicinity of airfield (predicted)	
Corporate Responsibility					
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					
GBBCA will continue to distribute its Community Newsletter to local residents with information on noise related matters	Ongoing	Quarterly	Community Newsletter distributed	N/A	
GBBCA will continue to operate a noise complaints 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	
GBBCA will review the location of the noise concern contact details as part of the planned website refresh	Mid 2014	N/A	Decision communicated to Forum	N/A	

At present there are no criteria or limit values for Quiet Areas. GBBCA await further guidance from the Department.

10. Long term strategy

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

The Action Plan will also be reviewed, and updated if necessary, following any major development which affects the noise situation or the designation of 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 will 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 to prevent and reduce noise and any potential effects on health and wellbeing in addition to the Airport's ongoing CR programme geared to supporting 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 Noise 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, a number of 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 LAeq, 16hr 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 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.

- **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. 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 Environmental Noise Regulations (Northern Ireland) 2006
EC Directive 2002/30 - on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community airports
EC Directive 88/337 (as amended)
Clean Neighbourhoods and Environment Act (Northern Ireland) 2011

Relevant policy and guidance publications

Department for Transport, the Air Transport White Paper, 2003
Department for Transport, Aviation Policy Framework, 2013
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
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

Department for Environment, Food and Rural Affairs (DERFA), Low Frequency Noise, 2002
Department of the Environment (DoE), Noise Mapping and Action Planning Technical Guidance – Noise from Airports, 2013
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
Environment Agency Horizontal Guidance for Noise Part 2 - Noise Assessment and Control, 2001
ERCD, Report 1208 Aircraft Noise, Sleep Disturbance and Health Effects: A Review, 2013
ERCD Report 0907 Environmental Noise and Health: A Review, 2010
ERCD Report 0908 Aircraft Noise and Children's Learning, 2010
Research On High Freq. Noise and It Effects – May 2003
DOE Circular 10/73 Planning and Noise (19 January 1973)
Environmental Impact Assessment (August 1999)
DMRB Screening Method Spreadsheet Version 1.02 November 2003
Transport Assessment; Guidelines for Development Proposals in N. Ireland Nov 06 DRD/DOE
ODPM -PPG24: Planning and Noise (1994)
World Health Organisation, Guidelines on Community Noise, 2000
World Health Organisation, 2009, Night Noise Guidelines for Europe, 2009
European Commission Working Group Assessment of Exposure to Noise (WG-AEN), Position Paper,
Presenting Noise Mapping Information to the Public, March 2008
EEA Technical Report No. 11/2010: Good practice guide on noise exposure and potential health effects
– October 2010
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
Defra, Estimating Dose-Response Relationships between Noise Exposure and Human Health in the UK. Project Report and Technical Report, 2009

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

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 the Environment Major roads – Department for Regional Development 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 that the loudest sounds we can hear before suffering

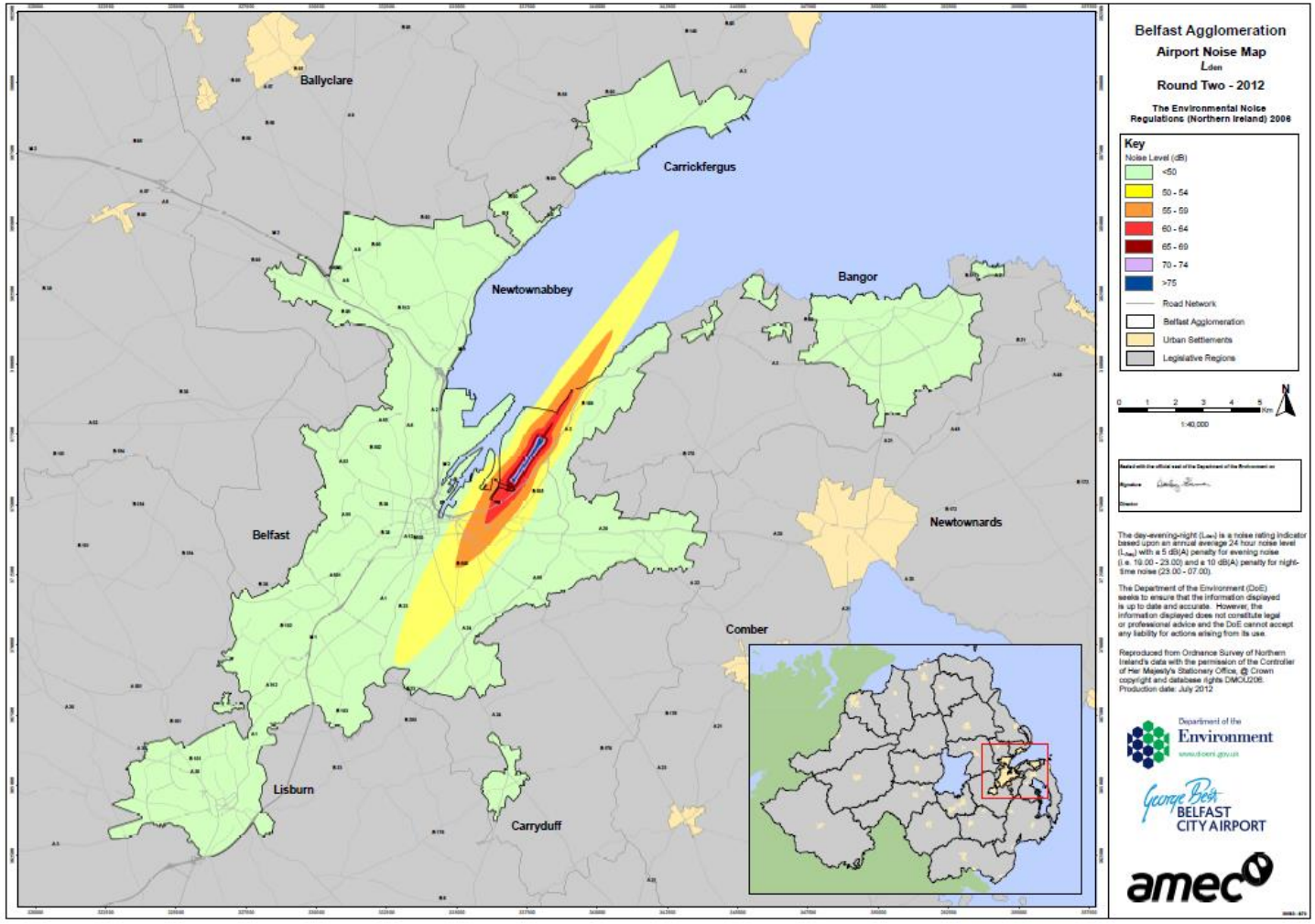
Term	Definition
	immediate hearing damage (around 100,000,000 micropascals) correspond to around 130-140 decibels.
dB (A)	Internationally accepted unit for most noise measurement and represents the sound pressure level weighted to correspond to the frequency response of the human ear. The human ear is 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 annum (approximately 8,200 vehicles per day) (Article 3(n)).

Term	Definition
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}) = LAeq,12hr(07:00 to 19:00). # For strategic noise mapping this is the annual average
Noise Level - L_e - Evening	L_e (or $L_{evening}$) = LAeq, 4hr(19:00 to 23:00) For strategic noise mapping this is the annual average
Noise Level - L_n - Night	L_n (or L_{night}) = LAeq, 8hr(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 – LAeq, 16hr	LAeq, 16 hr = LAeq, 16 hr (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 make it fit for purpose (includes operations sometimes referred to as ‘cleaning’ of data).

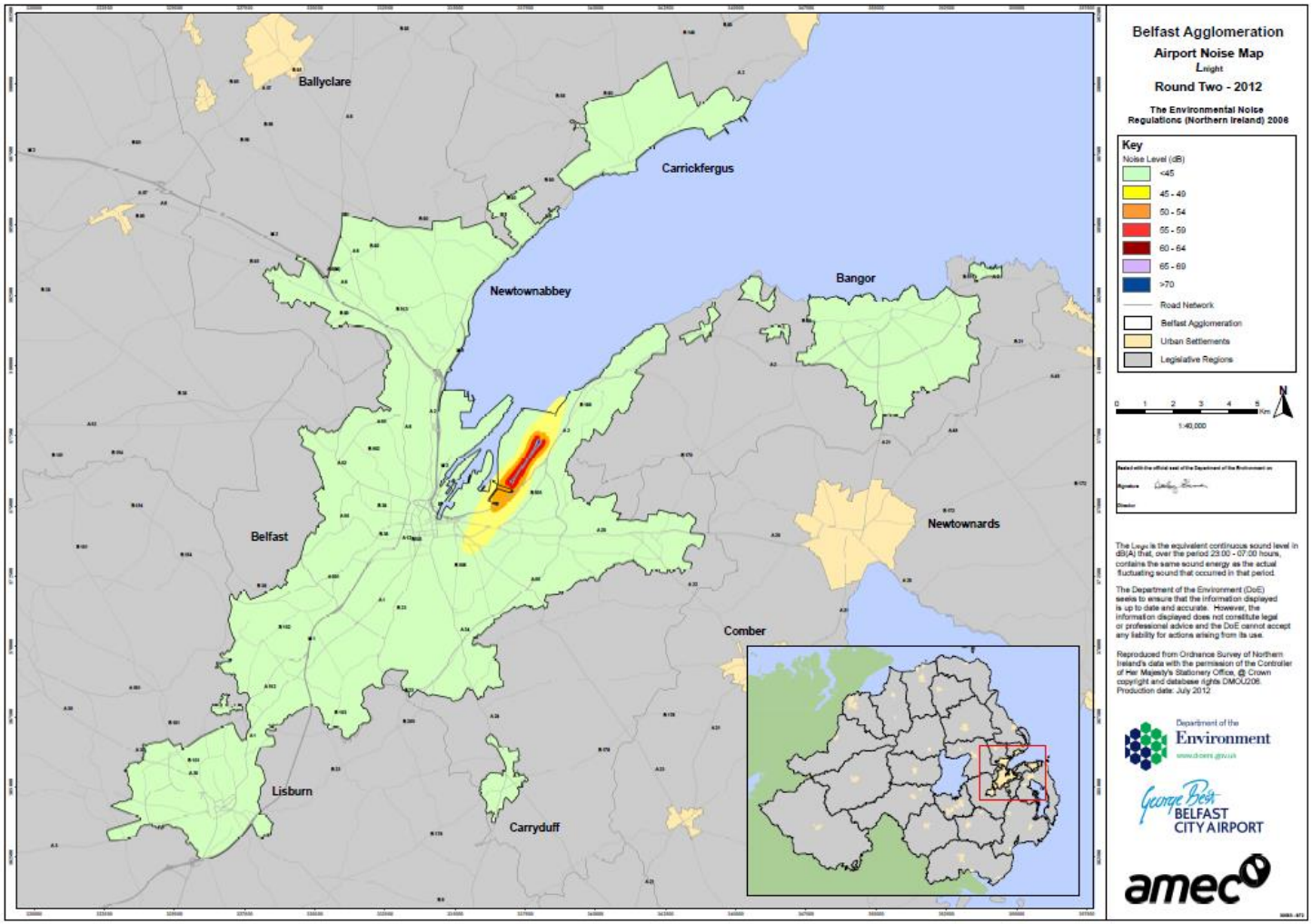
Term	Definition
Quiet Area	Article 3(l) and 3(m) of the END define a 'Quiet Area in an agglomeration' as an area, delimited by the Competent Authority, for instance which is not exposed to a value of Lden or of another appropriate noise indicator greater than a certain value set by the Member State, 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

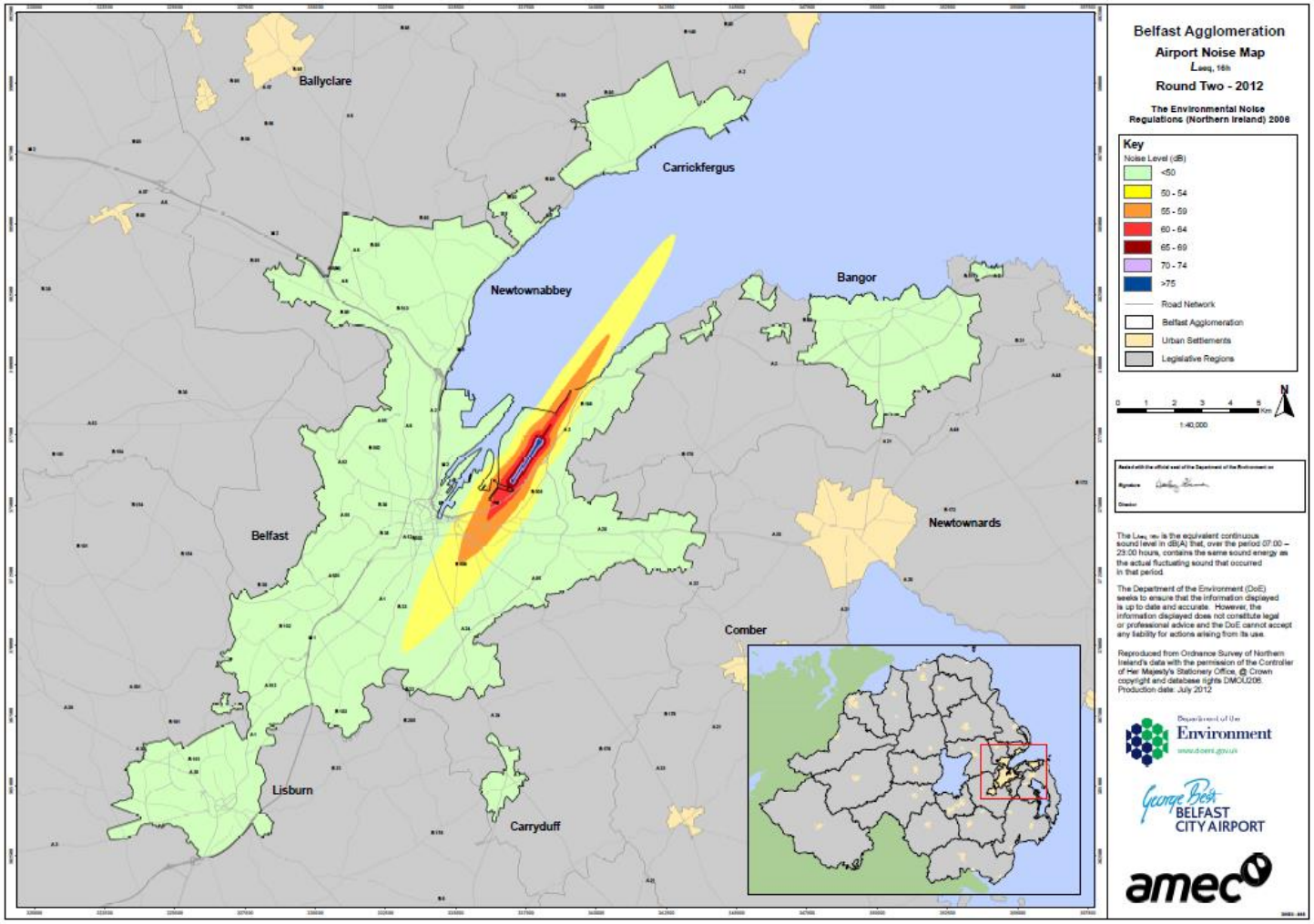
Noise maps for Airport within Belfast Agglomeration L_{den}



Noise maps for Airport within Belfast Agglomeration L_{night}

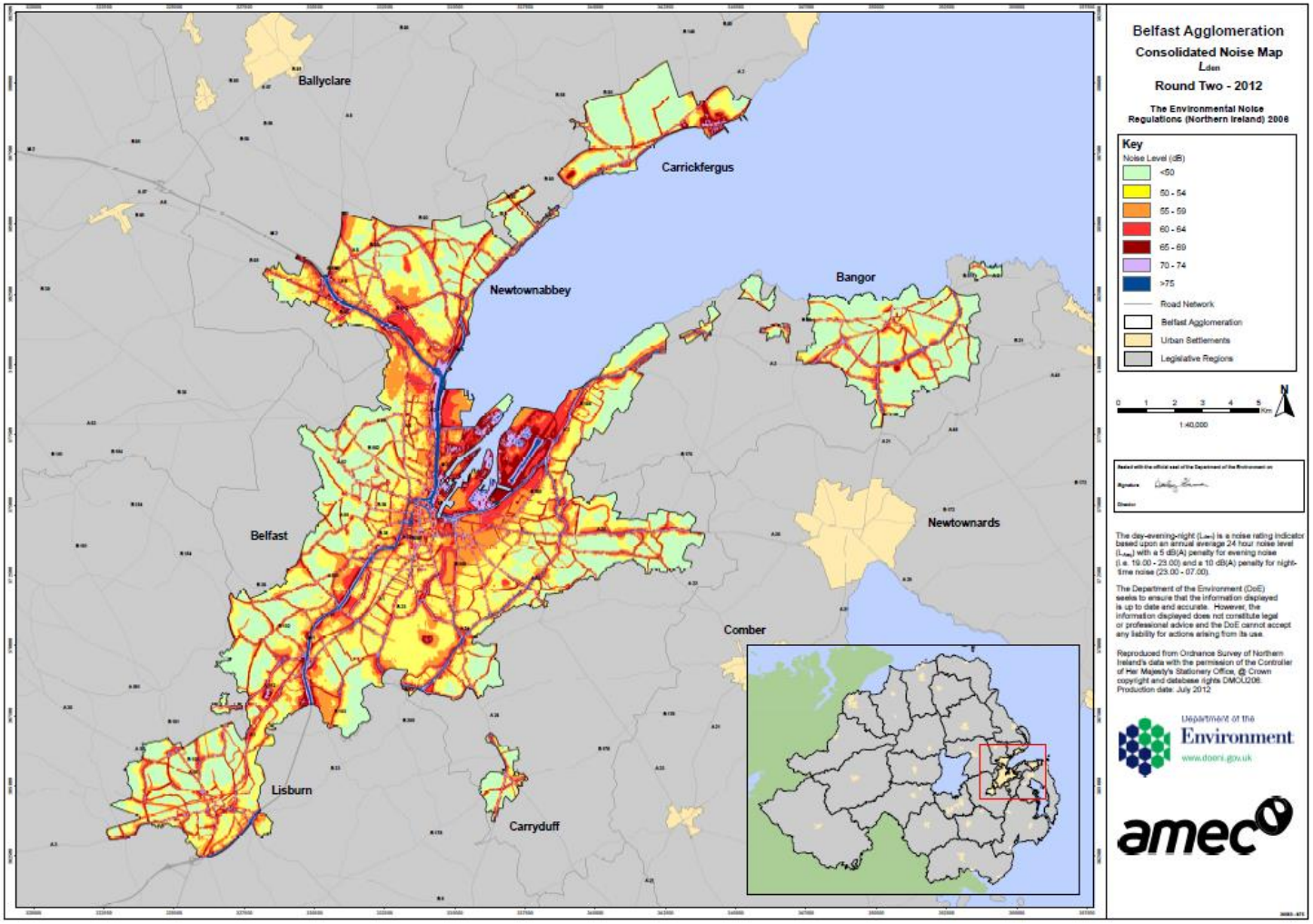


Noise maps for Airport within Belfast Agglomeration LAeq, 16hr

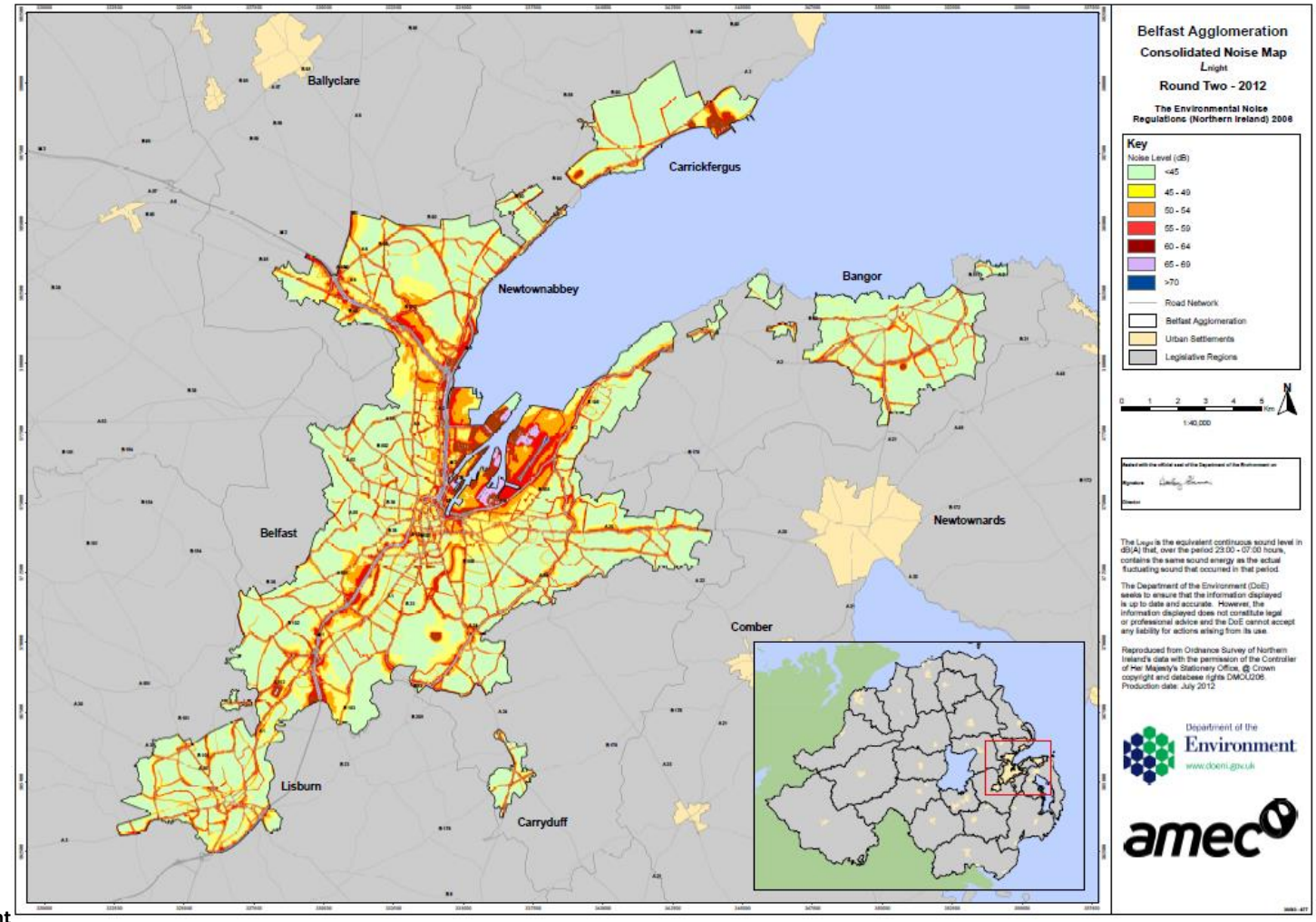


Appendix E: Consolidated noise maps for All Noise Sources within Belfast Agglomeration

Consolidated noise maps for All Noise Sources within Belfast Agglomeration L_{den}



Consolidated noise maps for All Noise Sources within Belfast Agglomeration



L_{night}

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: AMEC Environment and Infrastructure UK Limited

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: AMEC Environment and Infrastructure UK Limited

Appendix G: Summary of Draft Noise Action Plan consultation responses

1. **Timing and duration of consultation period**

GBBCA received a range of views with respect to the timing and duration of the consultation period.

Some respondents commented that the eight week consultation window was inadequate and the timing of the consultation (taking place during the summer months) unsuitable thus potentially impacting on the number and quality of responses. One respondent said that GBBCA had failed to "match even the minimum recommendation of eight weeks". Other respondents commented that the consultation period was sufficient.

The eight week consultation period is in line with the Department's 2013 guidance which recommended a minimum period of 8 weeks and took place over a period of 8 weeks from 14 June to 9 August 2013. The timing was influenced by the timing of the publication of the 2013 guidance (February 2013) and the END requirements.

GBBCA is satisfied that the public were provided with an effective opportunity to comment.

2. **Competent Authority role of GBBCA**

A number of responses questioned the role of GBBCA as *Competent Authority*.

Some respondents questioned the fact that airports are "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".

Another respondent commented that it welcomed GBBCA's "open and transparent executing of its responsibility in the Draft Noise Action Plan".

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

As detailed in Section 6.1, noise mapping was undertaken by AMEC Environment and Infrastructure UK Limited (AMEC). AMEC were commissioned by the Department 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, AMEC have prepared 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. Noise maps were approved by the Minister for the Environment and are published on the NoiseNI website.

3. Designation of (Candidate) Noise Management Areas (NMAs)

A number of responses were received regarding GBBCA's position on the designation of (Candidate) NMAs.

One respondent commented that as Important Areas (those areas falling above 60dB LAeq, 16hr or above) are exposed to noise levels which can lead to the onset of significant annoyance and which can cause adverse health impacts, GBBCA should consider designating these areas as NMAs.

Another respondent stated the 2013 guidance contains "contains a clear requirement to consider the creation of one or more Candidate NMAs".

A number of consultees contended that while the designation of Important Areas as NMAs should be the minimum undertaking, given that the level marking the "approximate onset of significant community annoyance" is recognised as 57 dB LAeq, 16hr, there is "a very strong case" for designating NMAs at this lower level.

The approach taken by GBBCA is in line with the 2013 guidance. 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 LAeq, 16hr due to noise from GBBCA). Having identified the areas containing the top 1% of the population above 50dB LAeq, 16hr (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.

GBBCA recognises the quality of life issues faced by the areas in question, among others, and seek to support these areas as part of its comprehensive CR programme. GBBCA's CR policy sets out a clear commitment to make a positive impact in its community and to be a key contributor to economic and social development. GBBCA are working to support neighbouring communities through its Community Fund, educational partnerships and its recently developed High Flyers Apprenticeship Scheme. As detailed in Section 8.2.5.2 of the draft Plan, through the Community Fund, GBBCA have supported over 60 local projects to the value of £135K. GBBCA dedicates over 2,000 salaried hours per year on volunteering to support programmes such as Time to Read, work experience for young students and it is currently working with training organisations to provide up to 10 apprenticeship placements this year.

4. ‘Acceptability’ of the Airport’s noise impact

A number of consultees questioned GBBCA’s position regarding the *acceptability* of the Airport’s noise impact. Respondents pointed to the fact that there is population exposed to the level marking the “approximate onset of significant community annoyance” and on this basis the Airport’s current noise impact cannot be considered acceptable.

Some consultees commented that the Community Attitudes Survey and/or the number of noise complaints received by GBBCA are not adequate or robust means of measuring the quality of life impact and the acceptability of current noise levels.

GBBCA notes the UK government’s position in the Aviation Policy Framework that the 57 LAeq, 16hr contour marks the approximate onset of significant community annoyance and the highlighting thereof, the subjective nature of noise in that not all people within this contour will experience significant adverse effects from aircraft noise and that people outside this contour may consider themselves affected by aircraft noise. GBBCA’s position was reinforced by the results of the Community Attitudes Survey which were considered to be robust and objective.

5. Belfast Lough Bias

Reference was made by some respondents to the Airport’s performance with respect to the Belfast Lough bias. Some consultees requested that the Airport seek to increase the target (of >50%) for the number of flights over Belfast Lough to reduce the noise impact on residents in the direction of Belfast city.

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.

Over 60% of arrivals operate over Belfast Lough on a monthly basis in practice but because of weather constraints, GBBCA does not consider it appropriate to set a firm target to achieve 60%. It has already committed to seek to maximise the Belfast Lough Bias where it is safe and feasible to do so.

6. GBBCA's noise complaints system

A range of views were received regarding the noise complaint system in place at GBBCA.

Some respondents expressed dissatisfaction with the complaint system on the grounds that:

- **It is not well advertised on the Airport's website**
- **Complainants either do not receive a response or a commitment by the Airport to take action a result of the complaint**
- **Complaints are not made to an independent adjudicator, but to the airport itself.**

For these reasons, the number of complaints made to the Airport is low as a result.

One consultee called for an independent noise complaints system, whilst another commented that it appreciated that GBBCA "listens and responds to residents, and others, through a professional complaints system".

Details of the Airport's Noise Complaints Handling System are set out in Section 8.2.5.1.

There is a Contact Us link is on the home page of the Airport's website. By clicking on this link, individuals are brought to a page that displays the noise hotline number or alternatively one can submit a comment or concern via this page. GBBCA will review the location of noise concern contact details and the process for logging a concern as part of a planned website refresh in 2013-14 and Table 11 has been amended to reflect this.

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 11, GBBCA aims to respond with an initial acknowledgement within 5 working days and should a further investigated response be required, GBBCA aims to issue within 15 working days subsequent to this. Where investigations reveal a failure to follow procedures for example, non-adherence to the Airport's noise abatement procedures, these are reported to the airline / operator in question, and complainants are advised of this action.

All complaints are logged and a report on the type of complaint and area of complainant is presented to the Forum at each meeting.

7. 2013 Community Attitudes Survey commissioned by GBBCA

One consultee expressed concern regarding the level of detail included in the draft Action Plan relating to the Community Attitudes Survey. They contended that the current level of detail given in the draft Action Plan was insufficient to assess its validity.

Further information on the Community Attitude Survey commissioned by GBBCA in 2013 is provided below.

Survey Background and Objectives

In 2003, as part of a review of noise at Northern Ireland Airports, the Department for Regional Development (DRD) commissioned a good practice guide to the assessment and management of noise disturbance caused by the operation and growth of NI Airports. In the same year, GBBCA commissioned a Community Attitudes Survey in order to understand how representative noise complaints were of the community as a whole and also to inform its noise management programme. Questionnaires were distributed to households in the postcode areas covering south and east Belfast and North Down which are overflown by aircraft to/from GBBCA (and also Enniskillen and Antrim town, which are not overflown, to act as control areas). The aim of the survey was to obtain the views of residents in Northern Ireland who may be affected by aircraft noise and to ascertain to what extent aircraft noise impacts on the quality of life, compared with other factors, especially other noise sources.

In 2013, BCA commissioned MVA Consultancy to undertake another Community Attitudes Survey in line with the survey carried out in 2003 for the purposes of:

- *assessing how attitudes have changed since the 2003 survey;*
- *evaluating the effectiveness of GBBCA's current noise management programme; and*
- *informing future developments including the update of its Noise Action Plan in 2013.*

Survey Methodology

There were minimum changes to the 2003 questionnaire, since consistency was considered essential for assessing how attitudes have changed since the 2003 survey. MVA had no technical reasons for changing any of the questions and MVA replicated the 2003 survey methodology as closely as possible to provide like-for-like measures of change in the attitudes of residents who respond to the survey. As before, MVA administered 5,000 questionnaires randomly to homes in the areas of:

- *Holywood, Outer Bangor, Central Bangor and Donaghadee to the east of GBBCA;*

- *Sydenham, Upper Newtownards Rd, Castlereagh, Ormeau and Carryduff to the south;*
- *Enniskillen further to the south and west; and*
- *Antrim to the north west.*

A total of 412 completed questionnaires were returned in 2013 (8%) compared with 842 responses (17%) in 2003, reflecting the public's reduced willingness to participate in surveys (potentially due to the bombardment of unsolicited mail and 'cold' telephone calls that the public receives nowadays). The survey was undertaken between 22 March and 12 April 2013.

The achieved sample size means 95% Confidence Intervals of no more than ± 5% for all reported findings. MVA considered this level of precision to be sufficient for GBBCA's needs. The results were not presented by survey area because of the size of the survey sample.

8. Health impacts of aircraft noise

A number of respondents expressed concern that GBBCA has not considered "the adverse effects on human health and quality of life" of the noise from its operations.

One consultee commented that the literature considered by GBBCA provides an "insufficient evidence base" for such assessing health impacts as it excludes some of the latest and most relevant research and guidance, in particular:

- **Hellmuth, T et al, 2012. *Methodological guidance for estimating the burden of disease from environmental noise.* World Health Organisation**
- **Berry, B. and Flindell, I. 2009. *Estimating Dose-Response Relationships between Noise Exposure and Human Health in the UK.* Project Report and Technical Report. Defra.**

This consultee contended that the Draft Plan did not meet the requirements of END as it is not aimed at preventing and reducing environmental noise and the harmful health effects of aircraft noise have not been taken into account.

The primary function of the Noise Action Plan is to prevent and reduce noise exposure which will have the effect of addressing any potential health impacts.

It is appreciated however that additional information would be of value to further clarify how potential health impacts are being addressed. The final Plan has been amended to include this additional information.

9. Impact of aircraft noise on schools / educational attainment

Some consultees commented that the Plan has failed to take into account the adverse impact of aircraft noise on children's education.

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 LAeq, 16hr contours for the various noise bands. There are no schools / colleges exposed to 63dB LAeq, 16hr 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).

However, it is clear that additional relevant information is needed regarding the level of engagement and additional support already provided to local schools and other educational institutions to mitigate and compensate for any impact from airport noise. The final Plan has been amended to include this information.

10. Accuracy of noise contours

One consultee sought to question the accuracy of the noise contour measurements. In particular, they questioned the noise levels reported for Kinnegar which are less than other areas in close proximity to the Airport, such as Sydenham and Ballymacarrett.

Another consultee commented that it believed the [noise] models utilised by GBBCA "are regarded as some of the best practice in the industry".

Noise mapping was undertaken by an independent consultant appointed by the Department. AMEC have prepared noise maps, all associated population exposure data and supplementary reports as required under the Regulations and the Directive. The noise mapping results were subject to review by the Department and the noise maps were formally adopted by the Environment Minister.

The noise levels identified at Kinnegar reflect departing aircraft following the 6 degree left turn after take-off over Belfast Lough.

11. GBBCA's current noise management measures

A number of comments were received in relation to noise-reduction measures already in force at GBBCA.

Some consultees commented that the draft Plan "relies heavily on the 2008 Planning Agreement". This agreement is not complete as GBBCA has not agreed an Indicative Control Contour in line with the recommendation of the EIP Report. The Draft Plan could be considered "misleading and inaccurate in its overview of current noise management measures" on this basis.

The draft Plan accurately sets out the measures currently in place.

As stated in Section 5.4, GBBCA has submitted a request to the Department 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 number of comments were received in relation to GBBCA's Corporate Responsibility initiatives. One respondent commented that it appreciates the support given to the local community "through employment and with grants and donations to schools and organisations as part of its innovative Corporate Responsibility plan".

Another respondent commented that while it commends the various CR initiatives undertaken by GBBCA such as its apprenticeship scheme, Community Fund and support for charitable causes, these initiatives (with exception of fines for flights after 21:30 hours) cannot be considered noise reduction measures. Moreover, fines are levied at a rate insufficient to deter flights after 21:30 hours.

Another consultee commented that they regarded the current noise control measures as "efficient and reasonable".

These comments are noted and GBBCA intends to continue the initiatives set out.

12. GBBCA's proposed noise management actions

A number of comments were received relating to the proposed noise management actions.

Some respondents commented that the draft Noise Action Plan is not aimed at reducing the level and extent of its noise impact. It contains "no significant measures or actions to reduce aircraft noise" such as fines for off-track departures, departure noise surcharges or implementation of "exceptional circumstances" clause in the Planning Agreement in respect of late flights.

One respondent suggested that GBBCA should consider actions which could be taken to reduce exposure to aircraft noise in lower level contour bands (54-59 dB LAeq, 16hr) as it is recognised that "the onset of annoyance or nuisance can also occur within lower contour bands".

GBBCA has a comprehensive noise management programme in place to address its noise impact and is one of the most restricted airports in the UK with a limit on the number of flights per annum and restricted operating hours (06:30 – 21:30 hours).

As stated in Section 9, GBBCA is currently investigating the feasibility of introducing a Standard Instrument Departure for departing aircraft on Runway 04 as a way of further improving airline adherence to noise abatement procedures (despite current compliance in excess of 95% for departures on Runway 04). GBBCA believe this is a more appropriate action to take at this stage, although fines for off-track departures remain a potential additional measure in the future.

As part of its request to vary the terms of its Planning Agreement, GBBCA has committed to the introduction of additional noise control measures.

GBBCA is conscious that delayed aircraft after 21:30 hours may cause a greater level of disturbance and takes the matter very seriously. A penalty system is in place for all delays after 21:30 hours in order to discourage delays after this time. Delayed flights after 21:30 hours remain the exception representing approximately 1% of total movements.

GBBCA are fully transparent about the number of delayed aircraft operating at GBBCA after 21:30 hours and reports this information on its website and to the Forum at each meeting. GBBCA also provides DoE (Planning) on a bi-monthly basis, with a breakdown of all delayed flights post 21:30 hours with an explanation for why an extension to our scheduled operating hours was granted in each case.

DoE (Planning) has noted that significantly, the level of extensions at GBBCA has remained at approximately 1% of the total air traffic movements for the last few years and it is satisfied that the Airport is, at present, in compliance with the terms of the 2008 Planning Agreement in regarding flights post 21:30 hours.

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

No further action is therefore proposed at this time.

13. Noise compensation scheme

Comments were received relating to the proposed Noise Compensation Scheme and the qualifying threshold.

One respondent suggested that given the small number of dwellings that fall within Important Areas, "the offer of acoustic insulation would be considered a significant good will gesture". Furthermore, "given the disadvantage already suffered within [Important Areas] in relation to health, housing, crime, unemployment, and educational attainment, some accommodation from the Airport in relation to noise relief would be welcomed".

Another respondent contended that GBBCA should at least equal the standard offered by London City Airport with respect to its noise insulation scheme.

It is GBBCA's policy to adhere to UK government guidance with respect to the provision of acoustic insulation. GBBCA recognises the quality of life issues faced by the areas in question, among others, and seek to support these areas as part of its comprehensive CR programme. GBBCA's CR policy sets out a clear commitment to make a positive impact in the local community and to be a key contributor to economic and social development.

GBBCA are working to support neighbouring communities through its Community Fund, educational partnerships and the recently developed High Flyers Apprenticeship Scheme. As detailed in Section 8.2.5.2 of the draft Plan, through its Community Fund GBBCA has supported over 60 local projects to the value of £135K. Over 2,000 salaried hours per year on volunteering for programmes such as Time to Read and work experience for young students and GBBCA is currently working with training organisations to provide up to 10 apprenticeship placements this year.

Another respondent requested that further detail of how a noise compensation scheme would operate in practice be included in the Noise Action Plan to better inform the debate about the balance between the economic and environmental effects of future development of the Airport.

GBBCA have considered this request and will commence a review of noise insulation schemes at other UK airports to inform any potential future scheme at GBBCA (should it be required). GBBCA will liaise with the Department for Regional Development in its development of a proposed future scheme. Table 11 has been amended to reflect this.

14. **Flight timings at GBBCA**

One respondent commented that although GBBCA is recognised as one of four *City Airports* by the European Union, no concession is made in the timetabling of flights (in particular early morning flights, flights after 21:30 hours and flights at the weekend) at GBBCA.

Directive 2002/30/EC on the Establishment of Rules and Procedures with regard to the introduction of noise–related operating restrictions at community airports and the Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003 place no requirements on airport operators in respect of timetabling of flights and no further action is proposed. GBBCA is one of the few airports in the UK to have restricted operating hours – 06:30 – 21:30 hours.

15. **Noise monitoring**

One respondent commented that while aircraft departing from GBBCA in the Belfast Lough direction fly over Seahill/Helen's Bay, noise measurements are not taken from these areas and no reference is made to noise levels experienced in these areas.

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 expert advice from acoustic experts, Bickerdike Allen Partners, and agreed with DoE (Planning) and DRD, in consultation with the Airport Forum.

Noise contours have been produced for GBBCA in accordance with the requirements of END. Details of how these were produced are set out in Section 6.1 while maps showing the average noise levels experienced by surrounding areas if in excess of 50 L den. can be found in Appendices D and E. Average noise levels at Seahill / Helen's Bay are below that threshold.

16. **Aircraft types operating at GBBCA**

One respondent expressed concern that the more recent airlines operating from GBBCA (Aer Lingus and British Airways) are operating larger planes which are causing more noise.

Whilst Aer Lingus commenced operations at GBBCA in October 2012, they are operating a fleet of mostly Airbus 319/320 aircraft which have been operated by BMI

(now British Airways) at GBBCA for over ten years. These aircraft comply with the more stringent 'Chapter 4' noise standard as determined by the International Civil Aviation Organisation.

Also, it is important to note that aircraft noise does not always correlate with the size of aircraft as other factors such as engine type and airframe design will influence the resulting noise impact. For example, the most recent Noise Contour Report[92] prepared for GBBCA shows the Airbus A319 to have measured noise levels (in SEL dB) less than those of the Embraer 195 in all modes (Arrival/Departure and Runway 22/44) despite having a larger seating capacity.

[92] Bickerdike Allen Partners, 2012. *Belfast City Airport Airborne Aircraft Contours*. A9581 R01 NW, December 2012