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POSSIBLE POLICY MECHANISMS FOR CONTROLLING NOISE AT FARNBOROUGH AIRPORT

On behalf of:

Rushmoor Borough Council

Report no: 21889.1v4

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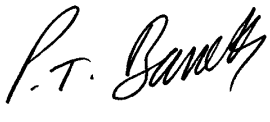
Report prepared by:
Hepworth Acoustics Ltd
21 Little Peter Street
Manchester
M15 4PS

On behalf of:
Rushmoor Borough Council

Report prepared by: **Peter Hepworth BSc FIOA – Managing Director**	
Report checked by: **Paul Bassett BSc MSc FIOA – Technical Director**	

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1.0 INTRODUCTION

1.1 Hepworth Acoustics was commissioned by Rushmoor Borough Council to carry out a study to investigate possible policy mechanisms for controlling noise at Farnborough Airport.

1.2 The assessment has been commissioned in relation to work being carried out by the Council on the Local Plan, in particular developing robust policy mechanisms relating to the airport. The aim of the project is to provide the evidence base on noise issues for consideration in the decision making process on new policies.

1.3 This report provides the full documentation of the study carried out. A brief introduction is provided to the development of business aviation use of the airport to provide the context for the current study. The current controls on airport operations relating to noise are discussed. Current UK guidance on the assessment of aircraft noise impact is discussed together with other aircraft noise assessment methodologies that have been considered. An assessment is made of noise control options, which includes taking in to account the comments made by the Inspector at the public inquiry in 2010 in to the proposals to increase the annual flight movement limit to 50,000.

1.4 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 BRIEF

2.1 The tender document from Rushmoor Council provided the following aim for the project:

> *In summary, the aim of this project is to prepare a study evaluating the planning policy controls in place at Farnborough Airport as they relate to noise, with reference to the National Planning and Aviation Policy frameworks, and to provide an analysis of possible future noise control mechanisms that could be introduced within the upcoming detailed policy document. Not only will this support the development and consideration of options for the future of the Airport, but it will also provide an evidential basis for any policies put in place.*

2.2 The following objectives for the project were provided:

> *To assess the current noise controls in place and to evaluate their relationship in terms of current national planning and aviation policy.*
>
> *In seeking to build upon existing noise control mechanisms, the outcomes of the project will need to provide a range of options that cover how the Council in its planning policies, could:*
>
> - *minimise the impact of noise and disturbance on the surrounding area;*
> - *control movements, particularly at weekends and bank holidays;*
> - *address the impact that the frequency of flight movements can have, and that of individual flight events, on the quality of life of local residents; whilst balancing this with the economic benefits that the airport brings.*

2.3 More detailed information was provided in the tender document on the policy issues to be considered. These are documented in 2.4 – 2.10 below.

2.4 There are a number of interrelated policy issues that need to be considered, all of which came under intense scrutiny during two past planning appeals for the development of the airport;

- How can RBC control the impact of noise and disturbance on the surrounding area?
- How can RBC control movements, particularly at weekends and bank holidays?
- How can RBC address the impact that the frequency of flight movements can have on the quality of life of local residents and also the noise impact of individual flight events?

2.5 The control of noise at Farnborough Airport has primarily been addressed via a restriction on movement numbers, and a noise contour budget, and is delivered by a combination of means. It is the preferred intention of the Council to enshrine this approach within future planning policy.

- Is this approach appropriate or are there alternatives that should be considered?
- What would be the advantages and disadvantages with any such alternatives in place?

2.6 The current noise budget is based on the Noise Impact Study undertaken by Hepworth Acoustics in 2009; however, this Study only covered the period up to 2019, with a recommendation to review beyond this date. Are the current noise contours (as set out in the conditions attached to the 2010 appeal) relevant as a basis for policy through to 2027, or does the opportunity exist to tighten the noise budget at some future date, whilst still recognising the Core Strategy vision and objectives as they relate to the airport? Criterion b of Policy SP 6 of the Core Strategy references an agreed baseline level (which is yet to be determined).

- Can or should the current noise budget be translated into policy up to 2027 to create a baseline level to this date?

- If it is acknowledged that a review mechanism will be required at some point post 2019, what sort of mechanism can the Council employ and how would it work in practice?

2.7 Policy is required that reconciles the need to protect amenity and improve the quality of life of local residents, whilst providing future capacity for growth at the airport, in line with Government policy.

- What possible policy options are available?

- What are the advantages and disadvantages of each, and the likely implications should any future planning application to increase movement numbers be received by RBC?

2.8 Weekend Movements. The current controls mean that by 2019 no more than 8,900 movements can be at weekends and Bank Holidays.

- How can the Council ensure that beyond 2019, noise at these times does not exceed a level that will be experienced under the current permission?

2.9 The need to recognise the sensitivity of residents to noise at weekends has been acknowledged by both Appeal Inspectors.

- Are there any statutory or legislative mechanisms that quantify the sensitivity of weekends and Bank Holidays?

- What options are available that can provide a framework under which criterion g of Policy SP6 can be achieved?

2.10 Use of 'subjective assessment tools'. The 2010 Planning Appeal Inspector suggested that the noise budget approach be supplemented by additional subjective assessment tools, such as the number of noise events, how noisy they are, their character and tonality, duration, frequency, propensity for grouping, the time at which and season in which they occur.

- What 'subjective' assessment tools are available and are these endorsed by nationally recognised standards or adhere to existing or emerging policy?

- What would be the implications of having such a mechanism enshrined in policy and how would it work in practice?

2.11 This report deals with the business aviation operations associated with the airport. Other aviation uses of the airport such as the SBAC airshow, military use and the DERA Flying Club may be referred to, but it was not part of this brief to consider any noise controls on these operations, mindful of the fact that they are 'lawful' uses outside the remit of planning controls. The other land uses on the airport site are also not included in this assessment.

3.0 DEVELOPMENT OF BUSINESS AVIATION AT FARNBOROUGH AIRPORT

3.1 Farnborough Airport has a long history of aviation use and developed as the home of the Royal Aerospace Establishment. Farnborough Airport was declared surplus to Ministry of Defence requirements in 1991. The first business aviation operator at the airport was established in 1989. In 1998, TAG was confirmed as the future operator of the business aviation airfield.

3.2 In October 2000, TAG Farnborough was granted planning permission for the use of the airport for business aviation and various works associated with bringing the airport up to CAA standards. This planning consent, together with the associated 2000 Deed, introduced a number of controls on the flying operations (and other noise generating activities) at the airport. These controls specified limits on the overall numbers of business aviation movements including a restriction on the number of movements at weekends and bank holidays.

3.3 In October 2005, a planning application was submitted by TAG Farnborough to increase the number of movements at weekends and bank holidays, whilst keeping within the overall annual movement limit. The application was refused by the Council in June 2006. Following a public inquiry in 2007, planning permission for the increase was granted in 2008.

3.4 TAG Farnborough commenced public consultation in 2008 on a Master Plan for the development of the airport to 2019. This consultation led to a planning application in June 2009 for an increase in the number of business aviation movements at the airport up to 50,000 per annum. The application was refused by the Council in November 2009. Following a public inquiry in 2010, planning permission was granted in 2011 at appeal to allow up to 50,000 movements per annum. The consent phases in the increased movements over the period to 2019.

4.0 CURRENT NOISE CONTROLS AT THE AIRPORT

4.1 Farnborough Airport is subject to a number of restrictions and measures which directly and indirectly limit the exposure of surrounding areas to aircraft noise. The restrictions and measures are generally either planning conditions or clauses in the 2010 Deed relating to the use of the Airport. The Rushmoor Local Plan Review (1996-2011) contained policies relating to noise from the airport. Most, but not all, of these policies have been translated in to planning conditions. In addition, some noise control initiatives have been developed by the operator as part of the work carried out for Farnborough Airport Consultative Committee. A summary of the current noise control measures is given below.

4.2 The planning consent of October 2000 contained a noise limit for operations at the Airport, planning condition 10. This condition was not carried forward to the 2011 consent. The noise limits for operations covered by the 2011 consent are covered by paragraph 2.1(a) of Schedule 1 of the 2010 Deed. This is an update of an original planning obligation and states:

> *Aircraft Movements other than Other Aviation Activity shall not exceed the areas within the annual noise budget, defined by the total land within both the 55dB(A) Leq contour (being 9.09 km^2) and the total land within the 60dB(A) Leq contour (being 4.01 km^2)It is further agreed that spare capacity within one year's budget shall not be carried forward to a future year.*

4.3 Paragraph 12.1 of the 2010 Deed provides an update of the noise contours applicable as follows:

> *For up to 50,000 Aircraft Movements the area within the annual noise budget for such Aircraft Movements (other than Other Aviation Activity)shall not exceed 72.5% of the land within the 55dB(A) Leq contour (72.5% being 6.6km^2) and shall not exceed 60% of the total land within the 60dB(A) Leq contour (60% being 2.4km^2).*

4.4 Paragraph 13.1 of the 2010 Deed documents how the increased number of movements is phased in to 2019.

4.5 The original planning limit on numbers of aircraft movements has been amended by the 2011 consent. It now reads:

> *No more than a total of 50,000 aircraft movements per annum shall take place, of which no more than 8,900 movements shall be at weekends and Bank Holidays. Furthermore, no more than 270 aircraft of the 1,500 aircraft movements per annum between 50,000 and 80,000 Kg. permitted by condition 11 shall take off or land at weekends and bank holidays.*

4.6 The hours of flying at the Airport are restricted by a planning condition that was carried forward to the 2011 consent.

> *All flying pursuant to this permission shall only take place between 07:00 – 22.00 hours on weekdays and between 08:00 – 20.00 hours on Saturdays, Sundays and Bank Holidays, except in an emergency. No flying pursuant to this permission shall take place on Christmas Day and Boxing Day.*

4.7 The hours of maintenance across most of the Airport are restricted by a planning condition that was carried forward to the 2011 consent.

> *All maintenance of business aviation aircraft shall only take place between 07:00 – 22.00 hours on weekdays and between 08:00 – 20.00 hours on Saturdays, Sundays and Bank Holidays, except in an emergency. No maintenance shall take place on Christmas Day and Boxing Day.*

4.8 A planning consent granted in 2013 allows maintenance and servicing activities to be carried out outside the hours that flying takes place within the existing "N" and "D" shed buildings and the new engineering hanger, and on specific areas of hardstanding and taxiways associated with the maintenance hangers. The consent includes conditions that only internal diagnostics and servicing can take place on areas of hardstanding and taxiways associated with the maintenance hangers, and no activity outside the maintenance hangers shall include the running of aircraft engines, use of an aircraft's auxiliary power unit or the use of air tools for the purposes of metal forming.

4.9 The type of flying is also restricted by condition in the 2000 planning consent. This condition has been carried forward to the 2011 consent.

> *No bulk freight services, scheduled passenger services, or "inclusive tour" charter flying shall take place. No training or recreational flying (other than recreational flying by the DERA Aero Club or essential familiarisation, training and flying checks by aviation crews) shall take place.*

4.10 The restrictions on freight services are amplified in the 2010 Deed. Paragraph 5.1 of Schedule 1 of the Deed specifies that no aircraft shall carry more than 100 Kg of freight in to or out of the Airport (except racehorses), and that no more than 100 aircraft movements a year may involve the transportation of racehorses.

4.11 The size of aircraft is restricted by a 2000 planning condition that has been carried forward to the 2011 consent.

> *With the exception of up to 1,500 movements per annum by aircraft not exceeding 80,000 Kg maximum take-off weight, no aircraft exceeding 50,000 Kg maximum take-off weight and no helicopters exceeding 10,000 Kg maximum take-off weight shall take-off or land at the Aerodrome pursuant to this permission.*

4.12 The 2010 Deed also includes a number of other noise controls that are not replicated in planning conditions or the Local Plan. Fixed wing aircraft, which are not certified to Chapter 4 or above, are not permitted to use the airport from 1st January 2013. Preferred Noise Routes have been agreed with the Council, and trials have been carried out to attempt to refine these routes. A track monitoring system is in place and the Company has committed to enforcing compliance with the preferred noise routes. Further requirements relating to the use of reverse thrust, engine testing, the use of APU's, noise monitoring, and noise prediction modelling are included in the 2010 Deed.

4.13 A comprehensive set of performance reports (including the results of noise contours produced using actual traffic data) are submitted by TAG to the Council and are published on the Council website.

4.14 There is a requirement within the 2010 Deed for the airport to use reasonable endeavours to promote and support airspace changes to benefit residents by creating a greater amount of controlled airspace around the airport. This process is currently being worked through by the airport operator, under the guidance of NATS.

4.15 A sound insulation grant scheme has been established such that sound insulation will be offered to the owners of residential, academic or health care premises which are predicted to be subject to noise levels of 60dB(A) Leq (16 hour, annual average) or above directly attributable to aviation use of the airfield (other than airshow noise or large scale military activity in the event of a national emergency). No properties have been assessed as meeting the noise level threshold for eligibility for this scheme under the operating parameters allowed by the current planning consent.

4.16 The 2010 Deed provides for a community environmental fund to be levied on business aviation movements at the rate of £2 per movement for aircraft up to 50 tonnes MTOW and £5 per movement for aircraft in excess of 50 tonnes.

4.17 The 2000 Deed also contained an obligation on Rushmoor Council to set up an Airport Consultative Committee in consultation with TAG. The Farnborough Airport Consultative Committee was duly set up and has been operating for a number of years. The Committee consists of 24 members and a chairman. The 24 members are equally divided between representatives of Airport Users, Local Authorities and Local Interest Groups. The Quiet Flying Programme that has been set up by TAG reports to the Committee. The Quiet Flying Programme has been set up to investigate a number of noise issues including changes to flight routing to determine whether or not these would reduce noise impact from airport operations.

4.18 Paragraph 12.3 of Schedule 1 of the 2010 Deed commits TAG to producing a voluntary Noise Action Plan. The Plan would be of a similar nature to a plan produced under the Environmental Noise (England) Regulations 2006, and would be produced within the timescale detailed within the Regulations. TAG produced the Noise Action Plan in 2012 and it contains a summary of noise control measures in Table J. In addition, a number of voluntary

measures that are being investigated by TAG are documented in Table K of the Plan. These include investigating the benefits of a departure noise preferential track, codes of practice for arriving and departing aircraft, the incorporation of new navigation technology for arrivals and departures and the development of the airport's noise and track keeping system.

5.0 NOISE GUIDELINES AND CRITERIA

5.1 In undertaking the assessment of noise, account has been taken of the following documents:

- Rushmoor Local Plan Review (1996 – 2011)
- Department of Transport, A Study of Community Disturbance Caused by General and Business Aviation Operations, (1988)
- World Health Organization – Guidelines for Community Noise (1999)
- MVA Consultancy - Attitudes to Noise from Aviation Sources in England – (2007)
- Attitudes to Noise from Aviation Sources in England Non SP Peer Review – (2007)
- Noise Policy Statement for England (2010)
- National Planning Policy Framework (2012)
- Aviation Policy Framework (2013)
- Airports Commission Discussion Paper 05: Aviation Noise (2013)

5.2 These documents contain discussion on current guidance for aviation noise levels and provide a context for the assessment of the noise aspects of the future flying activities from the airfield.

5.3 Further guidance on acceptable levels of environmental noise is provided in the World Health Organization (WHO) 'Guidelines for Community Noise'. The WHO guidelines suggests that *'to protect the majority of people from being seriously annoyed during the day time the sound*

pressure level in outdoor living areas should not exceed 55 dB $L_{Aeq,16h}$'. It also suggests that '*to protect the majority of people from being moderately annoyed during the day time the sound pressure level in outdoor living areas should not exceed 50 dB $L_{Aeq,16h}$*'.

5.4 The Department of Transport Study of Community Disturbance Caused by General and Business Aviation Operations made a number of findings related to specific aircraft noise levels. It found that below about 50 dB L_{Aeq}, General Aviation noise disturbance does not vary noticeably with changes in aircraft noise level. General Aviation noise disturbance increases noticeably at aircraft noise levels above 50 dB $L_{Aeq,}$ and at higher levels General Aviation noise is significantly more disturbing than noise around major commercial airports. This study included a number of airfields where circuit flying was a significant part of the noise exposure. This is not the case at Farnborough.

5.5 The most recent UK study of response to aviation noise is the Attitudes to Noise from Aviation Sources in England (ANASE) that was published in 2007. The study has been the subject of a considerable amount of debate regarding the robustness of some of its findings. It was subject to an extensive peer review process that recommended against 'using the detailed results from ANASE in the development of government policy'. However, the Department of Transport accepts that the study provides evidence that people are more annoyed by all levels of aircraft noise than they were in 1985 when ANIS (the previous aircraft noise study) was published.

5.6 Government guidance on planning and noise has changed since the previous report prepared by Hepworth Acoustics in 2009. The Noise Policy Statement for England was published by Defra in March 2010. This document sets out the long term vision of Government noise policy which is to '*Promote good health and quality of life through the effective management of noise within the context of Government policy on sustainable development.*'

5.7 The long term vision is supported by the noise policy aims stated as '*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life*.'

5.8 The document mentions the terms Lowest Observed Adverse Effect Level and Significant Observed Adverse Effect Level, but currently there has been no guidance or research published by Defra to provide objective criteria for these terms.

5.9 The previous government guidance on planning and noise, PPG 24, used a level of 57 dB L_{Aeq} as the boundary for Noise Exposure Categories A and B because previous noise measurement and social survey research had identified this level as the onset of annoyance for aircraft noise. This level was taken from the Aircraft Noise Index Study (ANIS) that was published in 1985.

5.10 In 2012, the NPPF was published and PPG 24 withdrawn. The NPPF provides some general guidance to local authorities on taking noise in to account in planning policies and decisions. This includes guidance that local authorities should 'aim to avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development'. However, no specific guidance is given in the NPPF on acoustic criteria.

5.11 The government has recently set up an independent commission, the Airports Commission, to consider the scale and timing of any requirement for additional airport capacity in the UK. Whilst the Commission is concerned with capacity for scheduled/charter passenger flights, its considerations on aircraft noise are relevant to the current study.

5.12 The Commission will carry out its work in the context of the Government's recent Aviation Policy Framework (APF) which sets out the Government's high level objectives on aircraft noise. The APF stated that:

- the Government's primary objective is to limit, and where possible, reduce the number of people significantly affected by aircraft noise;

- the Government wants to strike a fair balance between the negative impacts of noise and the positive economic impacts of flights; and

- as a general principle, any benefits from future improvements in aircraft noise performance should be shared between the aviation industry and local communities.

5.13 As part of the measures to reduce and mitigate noise, the APF discusses the concept of 'noise envelopes' as a way of providing information to local communities on future aircraft noise levels. The APF is somewhat vague on exactly what a noise envelope consists of. The draft APF, published in July 2012 discussed three options for noise envelopes, firstly a limit on the number of flights (or passenger number), secondly a contour describing the area exposed to a particular level of aircraft noise and the final option being a cap on the number of people exposed to a certain level of aircraft noise. The first two options are noise envelopes that can be completely controlled by the airport operator, the final option requires the land use planning system to play a role, otherwise the cap could be exceeded by people moving in to new developments near to the airport.

5.14 The Government's APF provides the overall national aviation policy framework for consideration of future policy options in relation to Farnborough airport. The Airports Commission's work is also directly relevant, because it has produced a Discussion Paper on Aviation Noise. This has resulted from an acceptance in the APF that there is still no firm consensus on how to approach issues around aircraft noise. As part of its work, the Airports Commission discussion paper on noise considers a number of alternative measures that have been proposed to reflect how aircraft noise is experienced by residents.

5.15 The Airports Commission work will include consideration of airport noise contours in terms of L_{Aeq} contours, usually over a 16 hour period, because this is the current approach used by UK airports to assess noise impact and therefore this approach will continue to aid continuity.

5.16 Some UK airports use maximum noise levels as a control mechanism. E.g. Biggin Hill has a maximum PNdB limit for aircraft using the airport, taken from noise certification data. Birmingham airport has day and night LAmax noise limits at noise monitoring locations and surcharges aircraft exceeding the limits. Farnborough Airport had an EPNdB noise limit in Policy FA2.2(A) of the Rushmoor Local Plan Review (1996-2011), although this is no longer in force. The maximum noise level is also used in the UK in the Quota Count (QC) methodology. This approach allocates a QC number to commercial aircraft based on the certified EPNdB noise levels. A QC for a given time period is then determined and if the QC allowance is 16, this could be made up of 16 movements of QC1 aircraft or eight movements of QC2 aircraft. Some airports will also use this approach to ban movements of aircraft over a given QC number. The QC index was developed for use with night-time operations at UK airports.

5.17 In order to consider aircraft noise control methodologies outside the UK, a review has been carried out of assessment methodologies used in other parts of the world. The review was commenced using the 'Boeing: Airports with Noise and Emissions Restrictions' website http://www.boeing.com/boeing/commercial/noise/list.page. This website provides a summary of noise control measures at over 650 airports worldwide. This data has been reviewed and updated by reference to individual airport websites.

5.18 The majority of assessment methodologies used throughout the world are based on the LAeq noise unit, or other similar energy averaging noise indices such as the Noise Exposure Forecast NEF. A variation of this approach is to use LAeq but to weight the index for certain periods. The main uses of this approach are the Day-Night Average sound Level (DNL/Ldn) where the night time period is weighted by 10 dB compared with the daytime, or the Day-Evening-Night Level (Lden) where the evening period is weighted by 5 dB as well as the night period being weighted by 10 dB. The Lden index is used by the European Union in relation to noise maps

and noise action plans prepared for all transportation noise sources under the Environmental Noise Directive (2002/49/EC).

5.19 The Australian Government has developed a number of further metrics on aircraft noise. The Number Above (N) contour has been produced to provide further information on the number of aircraft noise events above a certain noise level. The N70 contour is used in Australia to denote the number of aircraft noise events that produce an outdoor noise level above 70 dB(A). The N70 maps have a similar appearance to L_{Aeq} noise contour maps, but provide additional information about the number of aircraft movements that will be experienced above a particular noise level.

5.20 The N70 contour map would not necessarily show the number of all aircraft movements over a specific location during a day, because aircraft movements producing less than the 70 dB(A) noise level would not be included. Airport operation diagrams have therefore been used to provide further information on numbers of aircraft movements affecting areas around the airport, although they do not provide any specific noise information. The diagrams work by showing approach and departure routes from the airport with associated information such as the average number of flights per day and the range of movements per day.

5.21 The Australian government has developed the use of N contours to produce the Person Events Index (PEI) and the Average Exposure Indicator (AEI). The PEI is a measure of how many residents are exposed to a certain noise level. The AEI uses the results of the PEI and divides it by the number of residents exposed above the threshold level, to give an average level of events per person within the area.

5.22 The final example encountered of alternative noise assessment methodologies is the Respite chart, again developed in Australia. This chart provides information on the percentage of hours during the day that there will be no aircraft on a particular flight path. Additional information can be presented for defined periods e.g. morning or evening. This type of chart has been developed for airports with multiple runways and flight paths. This approach provides some useful information for multi runway airports, such as Heathrow, where there is

different use of runways at different times of day, but the usefulness of such a type of chart is limited where an airport, such as Farnborough, has a single runway operation.

5.23 Whilst many commercial airports around the world implement noise control measures, there are no ‘standard’ approaches to airport noise control other than the approaches listed above. This is illustrated by reference to the Discussion Paper 05 on Aviation Noise produced by the Airports Commission which in discussing alternative methods of describing aircraft noise (other than current UK methodologies) refers to the methods developed by the Australian Government, discussed above, and no others.

6.0 ASSESSMENT OF CURRENT FARNBOROUGH NOISE CONTROLS

6.1 This section of the report benchmarks how Farnborough performs in relation to current UK assessment methodologies and practice at other UK airports.

6.2 The 57 dB LAeq contour has long been used by the UK government to indicate the onset of significant community annoyance from aircraft noise. Although the Airports Commission is reviewing the use of additional indicators, the LAeq contours will be kept to provide continuity with previous assessments. Whilst the 57 dB contour has been used for most UK airports, the noise contours for Farnborough have used 55 and 60 dB to define the noise budget contours, although information on the 57 dB LAeq contours was provided in the TAG Farnborough Airport Noise Action Plan produced in 2012. Table G5 showed that no residents were within the 57 dB contour using the actual 2011 movement data of 22,977 business and helicopter aircraft movements.

6.3 The rebuttal proof of evidence by TAG's noise witness at the 2010 planning appeal in relation to the proposed increase of annual flight movements to 50,000 showed that in future some residents would be within the 57 dB contour. Table 1A of this rebuttal proof showed that with 50,000 annual movements there would be 1359 residents within the 57 dB LAeq contour.

6.4 The number of residents exposed in future to this level of noise places Farnborough at the lower end of the range for UK airports. Discussion Paper 05 from the Airports Commission shows in Table 2.1 the populations within the 57 dB LAeq contour using 2006 data. These range from 400 at Blackpool to 258,500 at Heathrow, with 2/3 of the airports being within the range of 1,000 to 7,000. It is likely that by the time that Farnborough Airport is at its movement cap of 50,000 annual movements, most of the airports shown in the Airports Commission Table 2.1 will be operating with higher numbers of movements than the 2006 figures, and hence the number of residents within the 57 dB contour will be higher than that shown in the table.

6.5 The production of the 55 dB LAeq contour for Farnborough allows a comparison to be made with the WHO guideline of 55 dB LAeq to protect the majority of people from serious annoyance during the daytime. The data from Table 1A of the rebuttal proof submitted by TAG's noise witness at the 2010 public inquiry shows 3060 residents within the 55 dB LAeq contour with 50,000 movements compared with 1282 residents with 28,000 movements. A similar pattern occurs as for the 57 dB LAeq contour, in that Farnborough Airport is at the lower end of the range for UK airports. Whilst there will be residents exposed to daytime noise levels above the WHO guidelines as a result of the business aviation operations at Farnborough Airport, it is normal to find large numbers of residents exposed to noise levels above WHO guidelines in all developed countries as a result of transportation noise (predominantly road traffic noise). It was estimated that in 2000, 210 million residents in EU countries were exposed to road traffic noise above the WHO guidelines ("Traffic noise reduction in Europe" by CE Delft, 2007). The WHO guidelines are currently a long term aspirational goal.

6.6 An analysis has been carried out of 44 United Kingdom airports (See Appendix II for list) to compare the opening hours of Farnborough with those of its peers. This list contains all of the main passenger airports together with the main smaller airports without scheduled or charter services but which have runways long enough to operate a full range of business jet flights. The information on opening hours has been taken from the UK Aeronautical Information Package. 30 of the 44 airports are open for as long as, or longer than, Farnborough Airport on a weekday. 32 of the 44 are open as long or longer than Farnborough airport on a Saturday, and finally 33 of the 44 airports are open as long or longer than Farnborough on a Sunday. This analysis shows that around ¾ of the main UK airports have opening hours that are as long as, or longer than, those at Farnborough Airport. The opening hours at Farnborough are therefore towards the bottom end, in terms of duration, of those used by the major UK commercial airports and those capable of significant business aviation movements.

6.7 Farnborough Airport has a limit of 50,000 business aviation movements per year set as a condition of the current planning consent. Many airports that have long established uses do not have a limit on the number of movements. Heathrow airport has a limit of 480,000 air

transport movements per year as a result of the Terminal 5 planning inquiry decision. Those airports that have movement limits often have them as a result of a condition attached to a major planning application. London City Airport now has an annual limit of 120,000 movements. Belfast City Airport has an annual limit of 48,000 movements. Biggin Hill Airport has a limit of 125,000 movements per year as a requirement of the lease between Bromley Council who own the site and the operators. The current limit of 50,000 movements per annum by 2019 at Farnborough is therefore at the lower end of the range for single runway airports that have movement limits.

6.8 Farnborough Airport will only allow Category 4 aircraft to operate as from 1st January 2013. No other UK airport operates this restriction, and no other airport in the world is known to operate this control.

6.9 Most major UK airports have noise monitoring systems installed around the airport, as does Farnborough. The noise monitoring systems are used for a variety of purposes at different airports. Some airports, such as Birmingham, use the noise monitors to measure maximum noise levels from aircraft and relate the results to noise criteria with fines for aircraft exceeding the criteria. Other airports use the systems for benchmarking the 'noise performance' of the airport and investigating trends and the effect of changes. Mobile noise monitors are often used to assess complaints at specific properties/areas.

6.10 Farnborough Airport uses two fixed noise monitors to benchmark the 'noise performance' of the airport. Noise measurement data has been used to correlate with predicted data, and also to improve the quality of the source noise data entered in to the INM aircraft noise modelling program. The mobile noise monitor approach has been used to investigate complaints and the effects of proposed operational changes. In the past, the fixed noise monitors were used to report the results of EPNdB noise levels to compare with the noise level specified in Policy FA2.2(A) of the Rushmoor Local Plan Review (1996-2011), although this has ceased as the policy is no longer in force.

6.11 Comparing the noise controls at Farnborough Airport with the UK and worldwide situation, it is clear that a systematic approach to noise control has been developed for the airport as a result of planning controls and TAG initiatives The airport is a world leader in banning Chapter 3 aircraft from operating. The daytime operating hours of the airport ensures that the greatest impact of aircraft noise, sleep disturbance, is not an issue for residents. However, there are some areas, such as noise monitoring and maximum noise limits, where it is considered that further improvements could be made. In addition, account has to be taken of the changes that are likely to occur over the lifetime of the Local Plan, and policies need to include appropriate noise controls and criteria to deal with the future.

7.0 DISCUSSION OF POSSIBLE FUTURE NOISE CONTROL OPTIONS

7.1 In carrying out this assessment, the overriding aim (taken from the tender document) has been that the future control of aircraft noise from the use of Farnborough Airport has to be assessed in the context of protecting amenity and improving the quality of life of local residents whilst providing future capacity for growth at the airport, in line with Government policy. This discussion looks forward at future noise control, in the context of planning for the long term future of the airport through to 2027.

7.2 Aviation noise produces a number of challenges when considering control measures. Despite significant improvements in aeronautical design, jet aircraft still generate very high source noise levels. Most noise arises when they are airborne, so traditional engineering noise control methods used for other types of noise sources, such as barriers, enclosures, tunnels etc, cannot be used for aircraft in flight. Research has shown that residents are more annoyed by a given LAeq level of aircraft noise than they are by the same level of road or rail traffic noise (EEA Technical Report 11/2010). It also appears that residents are more annoyed by a given level of aircraft noise than they were 30 years ago (Attitudes to Noise from Aviation Sources in England, DfT 2007).

7.3 A great deal of progress has been made on the control of aircraft noise over the last 40 years. International standards have been developed to limit the noise emitted by jet aircraft, and over the years, these limits have been reduced to make individual aircraft significantly quieter now than they were 40 years ago. Improvements in aircraft performance, such as increased rates of climb, have helped to reduce noise impact, particularly for aircraft departures. Further research and development is being carried out across the aviation industry to reduce noise levels. As a result of this, in February 2013, the International Civil Aviation Organisation reached agreement on more stringent noise limits for civil aircraft (Chapter 14), although this agreement has yet to be formally ratified. The noise requirement will be applicable to larger aircraft (55,000 kg or greater) in 2017 and smaller aircraft (below 55,000 kg) in 2020. The 2017 date will apply to the larger aircraft that are allowed to operate from Farnborough, principally the Boeing and Airbus business jets. These larger aircraft make up approximately

3% of the movements at Farnborough. The new noise limit will be 7 dB more stringent than the current Chapter 4 limits, although as the limit sums the results from 3 monitoring positions, the average noise reduction from an aircraft movement will be around the 2 dB level.

7.4 In addition to the new ICAO noise limits described above, work continues on future noise mitigation strategies. The Sustainable Aviation Noise Road-Map has been put together by Sustainable Aviation, an alliance of UK airlines, airports, aerospace manufacturers and air navigation service providers. This discusses aircraft and engine technology offering the potential to reduce perceived noise from aircraft by 65% (15 dB) by 2050 compared with 2010. Therefore future planning policy needs to consider that the trend for reduced noise emissions from individual aircraft is likely to continue. Balanced against this is the likely demand for increased passenger numbers and flights. The central trend in the latest Department for Transport figures shows an increase in UK air transport movements of 90% between 2010 and 2050.

7.5 This assessment is therefore written on the basis of a likely reduction in individual aircraft noise levels and government policy to provide capacity for growth in aviation.

7.6 The current planning controls related to noise from Farnborough Airport have evolved since the original grant of planning permission for business aviation use of the airport in 2000, but have maintained two fundamental features which work in combination. Firstly noise contour areas that must not be exceeded by business aviation use of the airport, and secondly a limit on the number of business aviation movements per year.

7.7 Current national planning guidance for noise provides very little assistance in determining specific planning controls to apply in a Local Plan, or measuring existing planning controls against best practice. The NPPF does not contain any suggested planning policies, or guidance on appropriate noise levels or controls. PPG 24, which was replaced by the NPPF, did at least contain some guidance on the assessment of aviation noise. The use of LAeq noise contours was recommended, with a comment that LAeq should not be relied on solely for airfields with

less than 30 movements per day. In appendix IV of PPG 24, draft planning conditions limiting the number of movements and the size of aircraft were included.

7.8 It is considered that the existing planning controls relating to noise from the business aviation use of Farnborough Airport are compliant with the guidance provided in current and recent national planning policy relating to noise.

7.9 The guidance within the government Aviation Policy Framework is that the 57 dB LAeq 16 hour noise index should continue to be used for airports, but that this should not preclude airports using other L_{Aeq} noise contours or other indicators to describe noise impact (although no alternative indicators are specified). Farnborough Airport's noise contours have been specified as 55 and 60 dB LAeq 16 hour contours and so are compliant with but more stringent than the APF guidance. It is considered that whilst there has been much discussion regarding the applicability of the 16 hour LAeq noise unit in general for aviation noise assessments, the use of the unit for assessing current and future noise impacts at Farnborough Airport is still valid, with the proviso that other units and indices should be considered to supplement the use of LAeq. Whilst the operating hours at Farnborough airport are 15 hours on weekdays and 12 hours on weekends and bank holidays, it is not considered that these variations from the 16 hour period cause any major distortions to the noise contours used, and they make no difference when comparing different scenarios with the same operating hours.

7.10 The current inclusion of a numerical limit for aircraft movements at Farnborough Airport has demonstrated that other indicators to control noise impact are already in use. Therefore, in broad terms, the current planning controls for Farnborough airport comply with the guidance in the APF.

7.11 The following paragraphs discuss options for how the Council can build upon existing noise control mechanisms to minimise the noise impact of airport operations, control movements particularly at weekends and bank holidays, and address the impact that the frequency of flights and individual flight events have on the quality of life of local residents. In this discussion, the detailed questions raised in the tender document will be answered.

7.12 The discussion of how RBC can control the impact of noise on the surrounding area covers the questions regarding the appropriateness of the noise contour budget and the restriction on movement numbers. The APF appears to be considering a noise contour budget approach in its discussion of 'noise envelopes'. The description of the benefits of providing certainty about future levels of noise around airports describes the function of the noise contours produced for Farnborough. At present, many commercial airports in the UK do not provide noise contours for future years, and so residents do not have certainty about future noise levels that could be accommodated with existing airport infrastructure and planning controls. The APF provides guidance on how 'noise envelopes' may be used in the future to provide assistance to local residents by stating that the benefits of future technological improvements should be shared between the airport and its local communities. This approach is taken as meaning for Farnborough Airport that, should there be a future planning application to increase the number of aircraft movements and should an increase in movement numbers be allowed, this would be on the basis that the future movements lead to smaller noise contours than those permitted by the current consent. This is considered to be an important factor in ensuring that future planning policy for Farnborough is consistent with emerging government policy for the control of aircraft noise.

7.13 In discussing the control of movements, particularly at weekends and bank holidays, the current primary controls are the numerical limits on overall movements and numbers of movements at weekends and bank holidays. Secondary control is provided by limitation of operating hours on weekends and bank holidays and the prohibition of flying operations on Christmas Day and Boxing Day. It is considered that the primary control in future should continue to be overall numerical movement limits and numerical movement limits for weekends and bank holidays. However, there are options that can be considered to enhance both the primary and secondary control of aircraft movements. Consideration could be given to differential treatment of Saturdays, Sundays and bank holidays. This could either be in the form of changed operating hours for Saturdays, Sundays and bank holidays or differential numerical limits. These changes could not be made to currently permitted operations, but would have to be policies to be applied to any future planning consent for the operation of the

airport e.g. if an application was made to increase the number of aircraft movements above current limits.

7.14 Initially, it may be considered that a lower (or zero) movement limit for Sundays or bank holidays may provide benefit for residents. However, zero movements on these days would have a significant impact on the operation of the airport. Farnborough Airport services international as well as UK traffic. Not all other countries have the same bank holidays as the UK, and in some countries, Sunday is not part of the weekend. Prohibition of flights from and to Farnborough on these days would be likely to significantly impact on the international business carried out by the airport, as well as UK business for sporting and leisure events. It is noted from the Performance Monitoring Report 2012 that movements were closer to the allowed limit for weekend movements (84% of allowed total) than the overall limit for movements (62% of allowed total).

7.15 An analysis has been carried out of operating hours at the 44 United Kingdom airports shown in Appendix II. The analysis was carried out of opening hours at weekends to determine differences in approach to weekend opening hours compared with weekdays (n.b. these are the actual opening hours and may be shorter than the opening hours allowed by any planning consents/established use). The information has been taken from the UK Aeronautical Information Package. Nineteen of the 44 airports have 24 hour opening, seven days per week. Fourteen of the remaining 25 airports have the same opening hours Monday to Sunday. This leaves eleven airports with different opening hours at the weekend compared with weekdays. In all eleven cases, the weekend opening hours are shorter than weekday hours. In five of these eleven cases, the duration of opening hours is the same on a Saturday as on a Sunday (although the actual opening hours may differ). In the remaining six cases, opening hours are longer on a Saturday than a Sunday in three cases, and shorter on a Saturday than Sunday in three cases. Current experience at other UK airports therefore demonstrates that whilst there is a recognition of the desirability of shorter weekend operating hours at some airports (25% of the sample), there is no clear indication of Sunday being a more sensitive day than Saturday in terms of length of opening hours. Farnborough Airport already operates with shorter weekend

hours than weekdays, and a later start on Saturdays, Sundays and bank holidays than on weekdays.

7.16 The daytime operating hours of Farnborough Airport, and the more restricted operating hours at weekends and bank holidays mean that night-time and early morning noise is not an issue for residents. It is considered that residents would not obtain significant benefits from small changes to the start or finish times of flying operations on these days. However, one area for consideration is the future amendment of business aviation operating hours to provide a curfew for a part of the weekend daytime to provide residents with a known period of respite from business flying operations, as a condition of any future planning consent. This could be achieved by prohibiting business aviation flights from Saturday afternoon to Sunday lunchtime.

7.17 Of the 44 UK airports considered, three airports currently have a period of closure over the weekend that could be considered as a daytime respite. These are London City Airport, Northolt and Londonderry. The UKAIP shows Londonderry Airport as closing at 17:15 on Saturday and opening at 11:30 hours on Sunday. However, it is understood that some of the restricted operating hours at Londonderry are due to financial constraints and are subject to change (the airport website currently shows slightly different opening hours). Northolt Airport is routinely closed between 15:00 on a Saturday through until 12:00 on a Sunday (although in exceptional circumstances opening times may be extended). London City Airport is closed each week from 13:00 on Saturdays to 12:30 on Sundays and this appears to have been a deliberate decision made at the planning stage of the airport to provide a period of respite for residents. A curfew would provide a known period of respite from business flights for residents, without taking away the ability of the Airport to deal with international flights, particularly where flights are timetabled for after the end of the UK working week (Saturday morning) or prior to the start of the UK working week (Sunday afternoon/evening). It would however reduce flexibility for the airport to deal with other weekend traffic and would be a significant change from the current planning regime that allows business aviation movements throughout the day on 363 days per annum. If the same (or increased) weekend flights were allowed in a future consent, the respite period would potentially increase the hourly numbers of

flights during the rest of the weekend if operators change the flight times to comply with the restricted opening hours. The business aviation respite period would not curb all flights within the respite period. There would still be some flights during the respite period e.g. flying club, SBAC, military, as these operations are lawful uses of the airfield and would not be impacted by any future planning applications for increased numbers of business aviation movements for Farnborough Airport. This would therefore weaken the impact of the business aviation respite period as residents would still experience some noise from flying activity, and it could be of similar types of aircraft to those used by business aviation. Considering the limited benefits of the respite period (in that not all aircraft movements would cease) and the restriction in the flexibility of the airport operator to deal with existing business aviation, this option is not recommended.

7.18 Farnborough Airport currently has differential movement numbers allowed on weekends and bank holidays compared with weekdays. Under the consented 50,000 movements per annum, an average of 162 movements per day are allowed on weekdays, and an average of 81 movements per day are allowed on a Saturday, Sunday or Bank Holiday. These limits are imposed as an annual limit for the two categories, so the number of movements will vary from day to day, as long as the overall movement cap is met.

7.19 The majority of the 44 UK airports considered do not have movement limits. Where limits are in force, they are in terms of an annual limit, with the exception of London City Airport. London City Airport has differential movement limits as follows:

i) 100 per day on Saturdays, 200 per day on Sundays, but no more than 280 on any consecutive Saturday and Sunday
ii) 592 per weekday, except for Public or Bank holidays.
iii) 132 on 1st January
iv) 164 on Good Friday
v) 198 on Easter Monday
vi) 248 on May Day
vii) 230 on late May Bank Holiday

viii) 230 on late August Bank Holiday

7.20 London City Airport primarily operates scheduled passenger flights, so it is easier to plan daily movement numbers. The nature of operations at Farnborough Airport means that it would be more difficult to plan for daily variations, and any daily limit may impact on the ability of the airport to deal with events such as major sporting events. However, it does demonstrate that the principle of variations in movement numbers at the weekend and bank holidays, and absolute daily limits, has already been established at another UK airport. It is questionable whether much benefit is registered by residents from the small differences in numbers of flights on different bank holidays. It is considered that the current reduced number of movements for weekends and bank holidays will provide a noticeable difference for residents compared with weekdays (approximately a 3 dB LAeq difference). However, there may be benefit in considering the imposition of a maximum daily limit for weekends and bank holidays in any future planning consent.

7.21 It is recommended that consideration is given to two options for a maximum daily limit at weekends and bank holidays for any future planning consent. The first option is that the maximum daily limit at weekends and bank holidays should not exceed double the average weekend and bank holiday movement level. This would ensure that LAeq 16 hr noise index from the worst case movement figure for a weekend and bank holiday would be no more than the LAeq 16 hr noise index for an average weekday movement figure. However, the operating hours are three hours per day less at weekends and bank holidays than on weekdays, so the same would not be true for average hourly figures. The current planning consent allows up to an average of 6.8 movements per hour at weekends and bank holidays and 10.8 movements per hour on a weekday. Therefore, if the maximum daily limit for weekends and bank holidays was set at 150% of the average daily limit, this would lead to an average of 10.2 movements per hour for worst case weekends and bank holidays, therefore not exceeding the average weekday hourly movement level.

7.22 In relation to the impact of frequency of flight movements and individual flight events, the following points are made. It is not considered that a planning control can provide a sensible

and workable control on the frequency of flight movements at the airport beyond the overall control provided by the movement limits. To control the frequency of flights would require micro management of the operations of the airport. It is understood that the airport does not have much forward knowledge of flights to and from the airport in terms of actual arrival/departure time (other than ensuring that these are within the allowed operating hours). Factors such as bad weather and air traffic control delays can change arrival times even once an aircraft has departed for Farnborough. London City Airport is the only known airport where there are planning restrictions on the frequency of flights over a given part of a day. The planning conditions state that only six aircraft movements are allowed between 06:30 and 06:59 and only two of these movements are allowed between 06:30 and 06:45. These restrictions apply to the early morning period when Farnborough Airport is not operational.

7.23 There are no known examples of airports operating a policy that restricts the frequency of flight movements during the daytime period. It is therefore not recommended that a policy on frequency of movements is introduced for Farnborough Airport.

7.24 The main impacts of an individual flight movement (in noise terms) are the maximum noise generated by the event, and the duration of the noise event. In broad terms, the higher the maximum noise level of the noise event, the longer the duration of the noise event will be. Therefore, the duration of the noise event is effectively controlled by the maximum noise level of the event. Policy FA2.2(A) of the Rushmoor Local Plan Review (1996-2011) contained a restriction of:-

> *No flying by aircraft with an average EPNdB greater than 98.9 at maximum take off weight*

7.25 Policy FA2.2(A) is no longer saved and therefore is not part of the 'development plan'. Therefore, currently there is no policy requirement for assessing maximum noise levels generated by business aviation use of Farnborough Airport.

7.26 Monitoring results of noise levels from aircraft in relation to this policy have been reported in the past. The last summary of measurements of average EPNdB for the top 10 aircraft types,

was reported in the 2010 Performance Monitoring Report, and showed all aircraft to be within the above limit by at least 9 EPNdB.

7.27 The previous policy is considered to have had deficiencies in the wording, in that the reference to an EPNdB noise level made no specific reference to monitoring locations. The TAG data related to measurements taken at the permanent noise monitoring terminals. Whilst these measurements would show the difference in noise levels between different aircraft types, they would not necessarily reflect the intent of the original planning policy. In addition, the reported results related to the top 10 aircraft types by number using the airport. This did not report results for the largest aircraft using the airport, the Boeing and Airbus business jets.

7.28 It is considered important that future policy contains a requirement to monitor and report maximum noise levels from all aircraft movements against an appropriate criterion. This is because the actual operation of an aircraft can vary the noise levels compared with the modelled noise emissions, and residents will experience the actual noise emissions rather than the modelled noise emissions. Traditionally EPNdB has been used to describe individual aircraft movements and is used for aircraft certification. However, LAmax is now used by some airports for assessing compliance with maximum noise level criteria. It is therefore recommended that maximum noise criteria are set for use in future planning policy. If one noise criterion is used, then it will provide a limit that will only bite on the largest aircraft that use Farnborough Airport, with no real impact on smaller aircraft. Therefore it is recommended that a two stage maximum noise level criterion is applied, with one limit for aircraft above 50 tonnes and another limit for aircraft below 50 tonnes. Currently, it is not possible to determine the actual noise limits as this would involve detailed assessment of the measurement data of maximum noise levels from current operations, but this is a recommendation for additional work to provide the detailed evidence base for this limit. In addition, it is recommended that policy requires a system of financial penalties to be imposed on operators of aircraft that exceed the maximum noise levels.

7.29 Alternative methods of control for maximum noise levels have been considered. The main alternative currently in use is the Quota Count (QC) system. The system was originally

developed for night flights from the main London airports, and has subsequently been used at a number of other passenger airports.

7.30 Aircraft are given a Quota Count (QC) as shown below. However, the QC is based on the EPNdB noise level band for take off and landing as shown in Table 1 below.

Table 1: Quota Count noise level bands

Noise Level Band EPNdB	Quota Count QC
<84	Exempt
84 – 86.9	0.25
97 – 89.9	0.5
90 – 92.9	1
93 – 95.9	2
96 – 98.9	4
99 – 101.9	8
>101.9	16

7.31 Many of the aircraft that use Farnborough are currently in the exempt category. To adapt the QC system for use at Farnborough would require new QC counts of less than 0.25, rather than an exempt category. Whilst in theory the QC method could be used to set additional protection for different times of the day, in practice it would be almost impossible to operate/police as the airport does not have detailed future knowledge of movements and times of arrival and departure. It is therefore recommended that a QC system is not used to control noise at Farnborough Airport.

7.32 The more specific issues raised in the tender document are now discussed. The first detailed query relates to the current planning control of a restriction on movement numbers and a noise contour budget, and whether this is appropriate for future planning policy or whether alternatives should be considered. It is considered that the current controls of movement limits and a noise contour budget should continue to form a major part of the noise control provisions in future planning policy. This is because the noise contour budget complies with emerging

government policy, and the numerical limit on movement limits is consistent with the approach used for most UK airport developments. Having carried out a wide ranging review of airport noise control, there are no obvious alternatives for these two approaches being the primary control mechanisms for Farnborough Airport. No change is recommended in the main control mechanisms for limiting noise impact from business aviation operations at Farnborough Airport.

7.33 The question has been raised that if the current noise budget is translated in to policy to create a baseline, what mechanism for review should be employed. It is considered that the current noise budget, based on the noise predictions carried out for the last planning application, provides a good baseline for Council policy up to 2027, as long as a review mechanism is incorporated that updates the baseline for any significant change. There are two possibilities that could cause change. The first possibility would be an update or revision of the INM aircraft noise prediction software. This is unlikely to result in significant differences, but it is important that like is compared with like, so that if future noise contour predictions use a new version of INM, the original baseline should be rerun with the new software. The second possibility would be a change in operating procedures at the airport. This includes the current review of airspace classification around the airport, which if implemented would give Farnborough Air Traffic Control more control of surrounding airspace, and reduce the number of variations to standard departure paths that have to be authorised currently by air traffic control because of conflicting traffic from other airfields. It is considered that on receipt of a future planning application that revised baseline contours be submitted to account for any such changes since production of the current baseline contours, and the revised noise contours should be independently reviewed prior to acceptance by the Council for use as the baseline.

7.34 It has been considered whether or not the baseline could be tightened within the period to 2027 without a planning application for additional movements being submitted. The airport has a lawful planning consent that allows up to 50,000 movements of Chapter 4 aircraft to produce the existing noise budget contours. It is considered that a planning policy that imposes smaller contours upon current operations may be viewed as ‘frustrating’ the current planning consent. However, it would be possible to impose a planning policy that only Chapter 14 business

aviation aircraft can be used at the airport after a particular time. TAG phased out Chapter 3 aircraft 7 years after Chapter 4 standards became applicable. On the same basis, this would give a phase out date of 2027 (7 years after the last part of Chapter 14 applies) for Chapter 4 aircraft. This approach is recommended and could be used to deal with any future changes in aircraft noise certification standards i.e. that aircraft certified under a previous ICAO Chapter should be phased out within a given period of any new ICAO Chapter noise limits coming in to force.

7.35 Maintaining the noise budget policy provides the Council with the option of being able to consider any future application for an increase in movement numbers at the airport whilst being able to achieve an overall reduction in noise contour size. This reduction in noise contour size would come about as a result of reductions in noise levels from individual aircraft, albeit with more noise events. Whilst the reductions in noise contour areas are likely to be relatively small, this policy approach does allow the Council to reconcile the need to protect amenity (in terms of overall L_{Aeq} noise levels) whilst providing future capacity for growth at the airport. Any Council policy that sought to maintain (or reduce) currently consented movement numbers at the Airport would be in conflict with Government policy. A policy could be implemented on the basis that at a review stage e.g. implementation of new ICAO noise limits, the noise budget contours would be reassessed.

7.36 The control of noise from weekend and bank holiday movements has already been discussed above in 7.13 – 7.21. The general principle of noise control for these periods is the same as for overall control of noise exposure of local residents, although additional options for noise control either by differential movement numbers for Saturdays, Sundays and bank holidays and/or a period of respite over part of the weekend daytime by amendment of the operating hours have been considered.

7.37 There are no statutory or legislative mechanisms that quantify the sensitivity of weekends and bank holidays. Economic and cultural changes in the UK over the last 20 years have led to less differentiation between weekends and bank holidays and weekdays in relation to commercial activities. Large retail units are now allowed to open on Sundays (albeit with restricted hours)

and licensed premises are allowed to have the same opening hours on Sundays as other days of the week. Most commercial activities do not have differential noise controls for weekends and bank holidays compared with weekdays. The vast majority of commercial airports operate fully over weekends and most bank holidays. Only a minority, such as London City Airport, have additional restrictions on operations at weekends and bank holidays compared with weekdays. Policy SP6 (g) of the Rushmoor Core Strategy requires flying at the most sensitive times of the day and the week to be limited to respect the amenities of residents. The current planning controls already prohibit night flying at Farnborough Airport. Night-time is by far the most sensitive time for residents, so residents are already protected for the most sensitive time of day. In relation to weekends and bank holidays, the opening hours are further restricted so that movements are not allowed between 07:00 and 08:00 and 20:00 and 22:00 compared with weekdays. The numbers of movements are restricted for weekends and bank holidays, so that on average there will be half the number of movements per day at weekends and bank holidays compared with a week day. Assuming a similar aircraft mix, this will result in a 3 dB L_{Aeq} reduction in aircraft noise exposure on these days compared with a week day. The current controls therefore already provide significant controls to limit flying at the most sensitive times of the day and week. It is recommended that the current differential protection of weekends and bank holidays is maintained by using the same ratio of movement numbers to weekday movements for all and large aircraft as contained in the current consent.

7.38 The topic of subjective assessment tools was raised by the 2010 Planning Appeal Inspector when he suggested that the noise budget approach could be supplemented by additional subjective tools, such as '*number of noise events, how noisy they are, their character and tonality, duration, frequency, propensity for grouping, the time at which and season in which they occur*.'

7.39 There are already a number of current objective planning controls that control some of the issues raised by the Inspector. The number of events is controlled by the limit on number of movements. The maximum noise level of the aircraft movements was controlled by the EPNdB limit previously contained in the Local Plan and could be contained in future planning policy. This is discussed in 7.24 – 7.28 above. The time at which the noise events occur is

controlled 'globally' by the hours of operation of the Airport. However, within the current or future operating hours, it is not considered feasible to use planning controls to limit movements to a particular time of day, day of the week or season. The airport operates on an 'on demand' basis from the business aviation operators compared with most other commercial airports where aircraft operate to a pre-determined schedule. Likewise, it is not considered feasible to control any grouping of movements, because the airport does not have control of the demand for flights or the operating times of flights (other than ensuring that they happen during the airport operating hours).

7.40 The character and tonality of aircraft noise is not considered an item that can be adequately assessed or controlled by a subjective assessment methodology. Aircraft noise is assessed using the EPNdB unit. EPNdB is a complex unit developed from measured noise levels, but taking in to account tonality and duration of the noise. EPNdB was developed to correlate with the level of annoyance experienced by humans in relation to aircraft noise. This unit, and any controls using it, already takes in to account the duration and tonality of the aircraft noise.

7.41 It is therefore considered that subjective tools are not capable of providing practical control of noise from Farnborough Airport, although it is considered that the subjective tools discussed below could provide further assistance in describing the future change in noise impact of any proposed intensification of use of the airport.

7.42 The N70 Contour Plans (or similar) would provide further assistance to assist residents with information about the average number of aircraft noise events (above a certain noise level) that would be likely to occur should a proposed intensification of use progress. This information could be compared with the current maximum scenario under existing planning restrictions. Proposed changes to the classification of airspace around Farnborough Airport would assist in reducing the number of deviations from standard departure paths because of other traffic, and therefore would increase the robustness of the N70 contours. It is envisaged that the N70 contours could be made a requirement to be submitted with any future planning application.

7.43 The Person Events Index (PEI) and the Average Exposure Indicator (AEI) could provide further information for consideration with future intensification proposals. It is considered that these indices are of more use for considering the overall impact of different options for expansion. At an individual level, the indicators add little that cannot be derived from N70 or L_{Aeq} contours. As previously discussed, the Respite plans are not appropriate for the type of single runway operation at Farnborough Airport.

8.0 RECOMMENDATIONS

8.1 This report has considered various options to achieve the noise control requirements detailed in the tender document for this study. A number of recommendations are made below for items to be included in future planning policy for the airport.

Primary Noise controls

8.2 It is considered that aircraft movement limits and noise budget contours should be kept as the central basis for control of aircraft noise from operations at Farnborough Airport. This would maintain the use of LAeq noise contours and an annual limit on business aviation movements. These controls comply with current and emerging government policy on the control of aircraft noise.

8.3 The noise budget contours should be recalculated to take account of significant changes that occur to either the INM noise prediction software or the operating procedures at the airport. It is recommended that on receipt of any future planning application, the noise budget contours are recalculated and replace the previous noise budget contours to be used for determining the impact of any proposed changes. Changes to operating procedures would include changes to controlled airspace around the airport, new approach or departure routes or profiles and any implementation of new navigation technology for aircraft using the airport.

8.4 To comply with emerging government policy, it is recommended that any future increase in movement numbers must lead to future LAeq noise contours smaller than the noise budget contours current at the time of the application for change.

Sensitive time periods

8.5 A number of options for changes to operating hours at sensitive time periods have been considered. However, for the reasons described in section 7, it is recommended that no changes are made to the operating hours for aircraft movements at the airport.

8.6 One area where change is recommended is that there is currently no limit on daily numbers of flights as long as the overall yearly figure is not exceeded. It is now recommended for consideration that a daily limit is imposed in future policy for weekends and bank holidays. Two options have been provided for consideration, the first is that the daily limit for weekends and bank holidays should be a maximum of double the average daily movements that are allowed on these days. The second option is that the daily limit for weekends and bank holidays should be 150% of the average daily movements allowed on these days.

Absolute noise levels

8.7 In order to control maximum noise levels from business aircraft using the airport, maximum noise limits should be applied for business aviation movements. It is recommended that the Council consider exploring the option of applying a two stage limit, one for aircraft over 50 tonnes and one for aircraft under 50 tonnes. Appropriate limits should be set for aircraft landing and taking off, as monitored at the two existing fixed noise survey terminals. The monitored levels showing average levels, range of levels and number of exceedances should be reported in the annual monitoring report. The operators of aircraft exceeding the specified noise levels should be fined, with fines being added to the community environmental fund. The method of determining the maximum noise level limit is explained below. The policy should also include a method of reviewing the maximum noise limits in the light of changes to aircraft noise limits made by ICAO.

8.8 In order to ensure that Farnborough Airport continues to maintain its world lead in ensuring that aircraft using the airport conform with the latest ICAO noise standards as soon as possible, it is recommended that Council look to secure a commitment to phase out aircraft that do not comply with the latest ICAO standard within a given time period on receipt of any future planning application.

Subjective controls

8.9 It is not recommended that subjective controls are made part of Council policy as it is not considered practical to control the airport operations in the way that would be required to control frequency, season or grouping of movements and time at which they occur. Other controls deal with the number of events and the nature and tonality of the noise. The duration of each noise event is fixed by the noise generated by the aircraft and the operation it is carrying out i.e. landing or take off.

8.10 The other 'subjective controls' such as N70 contours are not considered to be a control mechanism that can be enforced, but are more a method of providing information to residents on any proposed changes in airport operations or numbers of movements. It is therefore recommended that any future applications to change movement numbers should consider using N70 contours to illustrate the effect of the changes. It is also recommended for consideration that policy require the airport operator to provide N70 contours for any operating changes, such as extension of controlled airspace, that have the potential to change aircraft routing to and from the airport.

Extra work

8.11 It is recommended that further work could be undertaken to assess data from the fixed noise monitoring terminals to determine appropriate maximum noise limits to be put in place for aircraft using the airport. This would consider the appropriate noise limits for take off and landing of aircraft below and above 50 tonnes. It would also consider whether to use the EPNdB or LAmax noise unit.

9.0 SUMMARY AND CONCLUSIONS

9.1 Hepworth Acoustics was commissioned by Rushmoor Borough Council to carry out an assessment of future potential planning controls for noise from the use of Farnborough Airport. The assessment has been commissioned in relation to the preparation by the Council of the Delivering Development document that will deliver detailed policies in support of the Core Strategy.

9.2 This report has been prepared in response to a detailed tender document provided by the Council.

9.3 An overview has been provided of relevant noise guidelines and criteria and the current noise controls at the airport have been discussed. The current noise impact of the airport operations has been discussed in relation to relevant aircraft noise criteria.

9.4 Current and emerging government policy on aviation noise as well as noise control guidance used at other airports has been considered in the assessment.

9.5 The study has considered the appropriateness of the current planning controls and whether they can form the core of future noise controls for the airport, or whether alternative controls are more appropriate. The need for additional control measures has also been considered.

9.6 It has been concluded that the current controls continue to provide a good basis for future control of noise from business aviation use of Farnborough Airport, but that there are some areas where it is considered that new or altered controls are required.

9.7 It is considered that the recommendations made provide a robust basis for future Council policy on controlling noise from business aviation use of Farnborough Airport. The recommendations are evidence based from a wide ranging review of aircraft noise control policies and are considered to meet the requirements of protecting amenity and improving the

quality of life of local residents whilst providing future capacity for growth at the airport, in line with Government policy.

Appendix I – Noise Units and Indices

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

b) Frequency and hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously

varying, a number of other indices, are used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

SEL Referred to as the Sound Exposure Level (dB) this is the total A-weighted sound energy produced by an event and is effectively the L_{Aeq} of an event normalised to a duration of 1 second in length. SEL's can be scaled according to the number of events and can be further manipulated to provide an average noise level $L_{Aeq,T}$.

EPNdB Referred to as the Effective Perceived Noise Level. This is a measure of the noise from an aircraft movement, weighted to reflect subjective responses to aircraft noisiness.

Appendix II – List of United Kingdom Airports used in comparisons

Aberdeen
Belfast City
Belfast International
Biggin Hill
Birmingham
Blackpool
Blackbushe
Bournemouth
Bristol
Cambridge
Cardiff
Coventry
Doncaster Sheffield
Durham Tees Valley
East Midlands
Edinburgh
Exeter
Glasgow
Guernsey
Hawarden
Humberside
Inverness
Isle of Man
Jersey
Kemble
Leeds Bradford
Liverpool
London City

London Gatwick
London Heathrow
London Luton
London Stanstead
Londonderry
Lydd
Manchester
Manston
Newcastle
Newquay
Northolt
Norwich
Oxford
Prestwick
Southampton
Southend