Aviation Advice

in respect of

Planning Application Reference DC/14/2096/HYB

Captain J D Griffiths

Access Aviation Limited

Pascal House

55 Gatwick Road

RH10 9RD

Tel +44 (0) 7710 268702

Tel +44 (0) 1293 881333

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1 Details of Report Writers

Captain J D Griffiths

Captain J D Griffiths is a former RAF pilot with over 18 years' service and an experienced civil airline Captain. He has also flown commercially from both London Stansted and Norwich Airports. During his service career he spent 5 years based at RAF Coltishall in Norfolk.

He is a former subject matter expert on aviation to Kellogg Brown and Root, a major US Company involved in construction, military projects and aviation on behalf of both the UK and US Governments.

Captain Griffiths is also an experienced aviation Expert Witness and has accepted instructions to provide reports and oral evidence to the courts.

He is a member of the Expert Witness Institute and the Honourable Company of Air Pilots.

Assisted by:

Captain M C Stevens, MSc, BSc, FRAeS

Captain Mark Stevens is a retired commercial airline Captain with both training and management experience. Appointments held have included operational responsibilities for a large UK airline at major UK Airports which necessitated work on and with airport environmental committees to manage the externalities of airline operations.

He has been accountable for pan European airline projects and the day to day management and co-ordination of Flight Operations.

He is a Fellow of the Royal Aeronautical Society, serving on their Membership Committee and holds a BSc and MSc in subjects both aligned to aerospace.

Richard Poole, BSc, C.Eng. MRAeS

Richard Poole is a Chartered Aeronautical Engineer who has had a successful career with BAe Systems that included experience of technical management on international collaborative programmes. He has acted as a primary technical interface with partner companies in the United Kingdom and the United States of

America. His prime responsibilities involved the disciplines of research, feasibility study, proposal development and project management.

His engineering experience has been supported by his roles as flight test engineer on a number of aircraft programmes including Concorde, Hawk and Harrier, along with being an aerodynamicist and a fast jet flight test observer. He has given lectures on flight testing for AGARD, University of Tennessee and Cranfield University and taken part in design reviews for BAE SYSTEMS on the Joint Strike Fighter.

He has been awarded the Royal Aeronautical Society R P Alston Medal, is a Member of the Royal Aeronautical Society and holds a BSc in Aeronautical Engineering.

2 Introduction

2.1 This Report has been compiled by Captain J D Griffiths, assisted by Captain M C Stevens and Richard Poole of Access Aviation Limited on behalf of Evolution Town Planning, Opus House, Elm Park Farm, Thurston, Bury St Edmunds, Suffolk, IP31 3SH. Evolution Town Planning in turn are acting as agents for Pigeon Investment Management Ltd.

2.2 This Report is in part a response to the letter to Gareth Durrant, Planning Officer, of Forest Heath District Council, dated 2 March 2016 (the Letter) from Richard Buxton, Environmental and Public Law, 19B Victoria Street, Cambridge, CB1 1JP. The Letter is attached as Appendix 1 to this Report with paragraph numbers added in the left column for ease of cross referencing. This Report covers, from an operational viewpoint, points 17 to 24 inclusive contained within the Letter. The Report also covers the noise generated by the F-35A and the F-15C and F-15E. The Aircraft Traffic Control (ATC) procedures currently used at RAF Lakenheath and considers what the result of changes to those procedures could be after the closure of RAF Mildenhall. The Report also considers aspects of the F-35A's capabilities relating to safety aspects of the aircraft.

3 Glossary of Abbreviations and Descriptions

Afterburner	Afterburner (or a re-heat) is an additional component present on military supersonic aircraft. Its purpose is to provide an increase in thrust, usually for supersonic flight, take-off and for combat situations
agl	above ground level
Application	The Planning Application DC/14/2096/HYB
ATC	Air Traffic Control
ATMs	Air Traffic Movements
dBA	A-weighted decibels (unit used in comparison of sound levels)
F-15	McDonnell Douglas F-15 Eagle is a tactical fighter aircraft
F-35	Lockheed Martin F-35 Lightning II is a multirole fighter aircraft undergoing final development and testing
IFR	Instrument Flight Rules. Used by the fixed wing and rotary wing aircraft when the weather conditions are below limits for a visual approach and on other occasions when required.
Letter	Richard Buxton, Environmental and Public Law, 19B Victoria Street, Cambridge, CB1 1JP dated 2 March 2016
LAeq, 16hr	The A-weighted equivalent continuous sound pressure level averaged over a 16 hour period. Noise measurements are often A-weighted (using a dedicated electronic filter) to reflect the response of the ear to sound.
lbf	The pound-force symbol is a unit of force used in some systems of measurement including English engineering units – (used as a measurement of thrust)
MTOW	An aircraft's Maximum Take-off Weight
NAS (M)	Noise Amelioration Scheme (Military)

USAF	United States Air Force
VFR	Visual Flight Rules. These are used by fixed wing and rotary wing aircraft when the weather conditions are such that visual approaches are permitted

4 Scope of Evidence

4.1 The evidence contained in this Report deals principally with the aspects of flight operations relating to military operations at RAF Lakenheath and their bearing upon the local community, that have been raised in the Letter dated 2 March 2016 concerning planning application DC/14/2096/HYB.

4.2 I explain the air traffic control procedures in force at RAF Lakenheath for both fixed wing and rotary wing (helicopter) aircraft, the airspace surrounding RAF Lakenheath and RAF Mildenhall and the effect on that airspace with the planned closure of RAF Mildenhall. I highlight the current flying units based at RAF Lakenheath and the replacement of F-15 aircraft with F-35 aircraft from 2020. Aircraft using RAF Lakenheath will be operated to the procedures and standards regulated by the United States Air Force (USAF).

4.3 I describe the operation of F-15 aircraft on departure and arrival from the base when carrying out both instrument procedures (IFR) and visual procedures (VFR) from the runway when the aircraft depart and return to the base. I also explain the use of '*afterburn jet air emissions*'.

4.4 As part of familiarising ourselves with the concerns in paragraphs 17 to 24 of the Letter I have considered the flight operational aspects which the Letter seeks to link with the operation of the aircraft based at RAF Lakenheath. I have addressed relevant issues below in order to assist both the Parish Council and the Forest Heath District Council with the planning application DC/14/2096/HYB with their understanding of how aircraft presently use RAF Lakenheath and may do so in the future. My analysis includes interpretation of current standard operating procedures that arise on a daily basis.

5 Methodology

5.1 As part of familiarising ourselves with the Planning Application and the concerns expressed in the Letter we have researched the air traffic control (ATC) procedures attached as Appendix 2 and the Notes to Pilots dated 2012 attached as Appendix 3. Of note the Letter sets out 29 paragraphs and this Report addresses the issues contained in paragraphs 17 to 24. In addition, the Committee Report (Forest Heath District Council, expiry date 13 February 2016) for the proposal DC/14/2096/FUL has been consulted as a cross reference when required.

5.2 Captain M Stevens, R Poole and I have used our professional expertise and knowledge of aviation regulations, along with the application of aircraft standard operating procedures and military flying practices, to research and review evidence available in order to respond to the Letter.

5.3 By way of clarity, my response to The Letter is itemised covering respective issues raised in each paragraph. My response covers aircraft operational matters and the number and types of aircraft currently operating from the base. In addition, it discusses the arrival of F-35A aircraft. The F-35A will replace the F-15 aircraft currently based at RAF Lakenheath.

5.4 The closure of RAF Mildenhall and its possible effect on operations at RAF Lakenheath will be covered where appropriate in the responses to respective paragraphs of The Letter.

6 RAF Lakenheath – background information.

6.1 RAF Lakenheath, some 20 miles to the North East of Cambridge, is situated in Suffolk and is in close proximity to RAF Mildenhall.

6.2 The villages of Mildenhall, Eriswell, Lakenheath, Hockwold and Brandon are situated in the local area with Lakenheath being the closest.

6.3 At the time of writing this Report, RAF Lakenheath is currently the base for 48th Fighter Wing operating F-15 (variants E and C) and HH-60G rotary wing (helicopter) aircraft. This is a mixture of both fixed wing and rotary wing aircraft which, from current information available, can involve some 60 air traffic movements (ATMs) a day.

6.4 The geographic position of RAF Lakenheath relative to RAF Mildenhall necessitates detailed and safe operational procedures. Therefore departure and arrival routes are in place to ensure safe operations.

6.5 There is evidence of established visual departure and arrival routes under visual flight rules (VFR) for RAF Lakenheath. These established departure routes are available to pilots in the form of briefing notes and lay down both approved speeds and heights to be flown at various points on the route.

6.6 The orientation of the active runway (RW06 / RW24) is effectively south west / north east such that aircraft IFR arrival and departures are directed away from local residential areas to the north and south of the runway.

6.7 The influence of RAF Mildenhall to the south west of RAF Lakenheath is such that traffic leaving on the south westerly runway turn onto a northerly heading shortly after take-off. The resulting aircraft track is to the west of the village of Lakenheath. Aircraft departing on a north easterly heading currently track to the east of the village of Lakenheath.

6.8 Appendix 3 contains the heights and speeds fighter aircraft should follow. For example F-15 aircraft are prohibited from flying below 2000 feet on a visual approach from the north west when on a south easterly heading of 145 degrees. The initial approach speed for an F-15 is 300 knots reducing to a pre-landing speed of between 200 and 250 knots with a final approach speed of between 130 and 140 knots. The effect of these VFR arrival procedures for the F-15 means that the aircraft is slowing down throughout the approach and landing phase of the flight.

This process requires the aircraft to fly at a reduced power setting without the use of a power setting that could result in '*afterburn jet fuel emissions*'. Furthermore, this process would not result in '*creating excessive noise and vibration*' during either an IFR or VFR approach as the aircraft's engines would be at reduced power settings. I would expect F-35A aircraft to use the same methodology on the current visual arrival route.

6.9 Departing F-15 aircraft do use engine power settings that require additional power on take-off. This is known as re-heat, which increases fuel flow when used for take-off. Therefore the total products of combustion in the exhaust will increase roughly in proportion, along with a proportionate increase in engine noise. However, the take-off flight paths of the F-15s do not require overflight of the proposed development. I would expect F-35A aircraft to use the same methodology on the current visual departure routes.

7 The RAF Lakenheath based F-35 Aircraft

7.1 The Lockheed Martin F-35 Lightning II (F-35) is a family of single-seat, single-engine, all-weather stealth multirole fighter aircraft. The F-35 has three main models: the F-35A conventional take-off and landing variant, the F-35B short take-off and vertical-landing variant, and the F-35C carrier-based catapult assisted take-off and arrested-recovery variant. The F-35 variants are intended for the U.S. Air Force, Navy and the Marine Corps; only the F-35A is planned to be based at RAF Lakenheath.

7.2 RAF Lakenheath was chosen as the first U.S. Air Force European base to station two F-35A squadrons, following an announcement by the Pentagon. A total of 48 F-35s, making up two squadrons, will replace the 48th Fighter Wing's already existing F-15C and F-15E Strike Eagle jets. RAF Lakenheath currently has 3 squadrons of F-15s so with the effective loss of one squadron there will be in the region of 18 to 24 fewer fighter aircraft flying from the base.

7.3 The reduction of aircraft at the base should result in fewer air traffic movements (ATMs) of around one third.

7.4 At the date of writing this Report it has not been possible to establish the average number of flights per day by F-15 aircraft at RAF Lakenheath. Therefore, by way of illustration I have used my knowledge and experience of my time when I served on RAF fast jet squadrons in paragraphs 7.5 to 7.8 below.

7.5 For the purposes of this Report I have assumed that each F-15 Squadron operates 24 aircraft. This is the same number of aircraft that will be assigned to an F-35 Squadron at RAF Lakenheath. On any given day approximately 3 aircraft will be undergoing major servicing and therefore not available to fly. In addition to those 3 another 5 will be unavailable due to minor rectification that prevents them from flying. Therefore approximately 16 aircraft will be available to fly.

7.6 With 16 aircraft available to fly I would expect somewhere in the region of 32 sorties to be flown resulting in 32 take-offs and 32 landings for each squadron making a total of 96 sorties per day.

7.7 When the F-35A's replace the F-15s at RAF Lakenheath there will 2 squadrons with 24 aircraft. Therefore, using the figures in paragraphs 7.5 and 7.6 above there

would be a reduction in sorties from 96 to 64, along with an overall reduction in noise.

7.8 It is important to note that the number of sorties flown per day by fighter aircraft at RAF Lakenheath will vary. On days when the weather is poor the number will be reduced and when the Squadrons are on exercise the numbers will increase.

7.9 At the date of writing this Aviation Advice I have not been able to ascertain the methodology to be implemented for the replacement of F-15 aircraft by F-35A aircraft at RAF Lakenheath. Therefore, I have used my knowledge of the replacement of RAF Jaguar aircraft by RAF Tornado aircraft at RAF Bruggen in Germany to illustrate a method by which the replacement could be made.

7.10 At RAF Bruggen there were 4 Jaguar Squadrons and each squadron occupied their own site at the airfield. This consisted of hardened aircraft shelters that housed the aircraft and additional buildings used by the squadrons. I would expect the same sort of arrangement to be in place at RAF Lakenheath for the 3 F-15 Squadrons.

7.11 As each Jaguar Squadron occupied a site it was necessary for that squadron to completely vacate the site before the arrival of the Tornado aircraft. This enabled the required modifications to the site to be completed. Therefore, as each squadron was replaced there was, for a period of time, a reduction in the number of aircraft operating from the base.

7.12 I would therefore expect a similar process to be implemented at RAF Lakenheath whereby the sites currently occupied by an F-15 Squadron are vacated prior to the arrival of the F-35A Squadrons.

7.13 In the event that an F-35A Squadron arrived prior to the departure of an F-15 Squadron it would only be for a short period of time when there were additional aircraft flying from the base.

7.14 However, there may be the possibility that as a result of the current political situation in Europe and in particular, its eastern borders, there are plans for RAF Lakenheath that are not yet in the public domain.

7.15 For example, one squadron of F15Cs is due to leave RAF Lakenheath in 2017 to be replaced by two squadrons of F35A's in 2022. These F35A Squadrons may then operate alongside the remaining F15E Squadrons. This will result in an increase in

the number of aircraft based there. However, I would expect that, in the fullness of time, the F15E will be phased out of service.

7.16 One reason for the additional squadron to be based there may be to support the eastern flank of NATO. If this scenario is correct, then it seems reasonable to assume that, although RAF Lakenheath will remain their home base, the aircraft and squadrons will deploy to military bases in countries such as Turkey. Without knowing the plans, which in any event, may not have been finalised, there is likely to be a permanent detachment of aircraft and squadrons away from Lakenheath at military airfields close to their anticipated theatre of operations. It is difficult to make accurate predictions of future plans based on current announcements that are in the public domain.

7.17 As an aside, it appears the USAF is finding it difficult to afford the F35As and that full rate production of the F35A is not due to start until 2019. The USAF expects that it will have its full complement of F35A's in service by 2038. My understanding is that the USAF is also upgrading the capability of a limited number of F15E's as an interim measure, in part because the procurement schedule of the F35As may not be affordable. These procurement issues may have a bearing on the future of aircraft numbers based at RAF Lakenheath.

7.18 However, having said all of the above, I would expect any new development in close proximity to Lakenheath village to experience the same amount of 'noise'. It is also my opinion that, with the closure of RAF Mildenhall, the ATC procedures for RAF Lakenheath will change. The result of this change will reduce the amount of noise in the vicinity of Lakenheath village and its surrounding area.

7.19 The current ATC procedures for both RAF Lakenheath and RAF Mildenhall are designed to minimise the risk of mid-air collisions between aircraft operating from both bases. I therefore expect that when RAF Mildenhall closes there will be a re-appraisal of the procedures at RAF Lakenheath that results in better management of the noise generated by departing and arriving aircraft.

8 The F-35 Noise Characteristics

8.1 The information in this Section has been obtained from various sources including Wikipedia.

8.2 The F-35 engine produces a maximum of 28,000 pounds of thrust (lbf) without the use of re-heat and 43,000 lbf with re-heat. Re-heat on all fighter aircraft is used for take-off and when required in combat. It is not used for the approach and arrival at an airfield.

8.3 Table 1 below gives a comparison of thrust between the three types of aircraft. It is noticeable that the F-15E's maximum take-off weight (MTOW) is considerably more than both the F-15C and F-35. It is likely, that with the increased thrust of the F-15E using re-heat on take-off, the noise generated will be greater than the F-35.

Table 1

Data	F-35	F-15C	F-15E
Crew	1 pilot	1 pilot	2 pilots
Engines	One	Two	Two
MTOW	70,000 lbs	68,000 lbs	81,100 lbs
Thrust with re-heat	43,000 lbf	47,500 lbf	58,500 lbf
Thrust without re-heat	28,000 lbf	29,180 lbf	35,600 lbf

8.4 The F-35 is also a smaller aircraft than the F-15 and the following information is taken from the F-35 Noise Measurement Executive Summary, obtained from the http://www.jsf.mil/ web site attached as Appendix 6 to this Report.

8.5 Figure 1 in the Report (Appendix 6) gives comparisons between various aircraft including the F-35A, F-35B and F-15C for both maximum continuous power without re-heat (afterburner) and with re-heat power (afterburner engaged). On the ground, without re-heat, the F-35A is 1 dB louder than the F-15C. Although the F-15E is not included in Figure 1 it is likely that it has a higher sound pressure level than both the F-35 and F-15C because of the increased thrust of its engines.

8.6 Table 1 in the Report (Appendix 6) gives comparisons between aircraft in various conditions of flight. The F-35A is compared to the F-16 C/D and the F-35-B is compared to the F-18C/D/E/F. The F-15C and F-15E are not in the Table.

8.7 In my opinion, the data indicates to me that, as the Executive Summary states, in Figure 1, the F-35 is '*comparable with most legacy fighter aircraft*' when it is on the ground. Table 1 indicates that there are differences between the F-35 and the other aircraft depending on condition of flight and whether or not the other aircraft are fitted with the latest generation engines. For the purposes of this Report it should be noted that the visual arrival route, in the vicinity of Lakenheath village, is flown at 2000 feet above ground level, whereas the data in the Table is measured for an aircraft at 1000 feet above ground level. In my opinion, I would expect the same type of aircraft, when flying at 2000 feet to be quieter than when it flies at 1000 at the same speed. It is for an acoustics expert to comment on the difference an increase of 1000 feet would make to the noise foot print.

8.8 Customers for the F-35 have been supplied with measured noise information to allow them to conduct their own Environmental Impact Statements. This data package includes comparative data for F-15, F-16, F-18 and AV8B aircraft.

8.9 The F-35A capability is closest to the F-15C and F-15E. The F-15E has a more powerful engine (PW-229) and total engine thrust levels, maximum take-off weight and numbers of crew and engines are listed in Table 1 above. (Note the F-15E's operating from RAF Lakenheath are fitted with the PW-229 engine).

8.10 The issue of noise and its impact on the environment is addressed in Appendix 7 by a Report by Mr Mike Potts (BSc Hons/Lon, MSc, PGDip), Director and Principal Acoustic Consultant at Echo Acoustics Limited, a Technical Appendix on Noise (and Vibration).

9 The Letter and Response

9.1 I have reviewed each paragraph in the Letter in turn and report my findings below:

10 Paragraph 17

The proposed development site has the risk of serious environmental emissions (noise and air quality) from the military flight operations, which make this site fundamentally unsuitable for residential development and, in particular, a primary school.

Response

10.1 Inspection of the relative geography would indicate that the development site is not at any greater risk of serious environmental emissions than those which already exist in other areas of the parish since the site is on the approach path (and not the departure path) used by the fast jets on recoveries to visual circuits to the 24/06 runway. Whilst passing over or close to the proposed development site the aircraft would normally be at height of 2000 feet or higher above ground level with the engine at a low to moderate thrust setting, the undercarriage retracted and at a reducing airspeed of 300 knots and below. The engine afterburner would not be in use and there would be no '*afterburn jet fuel emissions*'.

10.2 The closest point of the proposed development to the centre of the active runway (RW06/RW24) is 2.76km (1.71m); this compares with existing residential housing in Lakenheath which lies at a distance of 1.8km (1.1m).

10.3 The proposed development lies to the north west of the airfield and, in view of the runway orientation, is outside the normal routes taken by aircraft on instrument departures or arrivals.

10.4 Procedures do allow visual arrivals and departures in accordance with VFR in good weather conditions. Aircraft conducting VFR arrival procedures currently route close to or over the proposed development site (fixed winged inbound / rotary winged outbound and inbound). It is not clear when looking at the arrival path for F-15 aircraft depicted in Appendix 3 if the aircraft would fly over the proposed development or just to the east of it. Aircraft would be at reduced speeds, at a minimum height of 2000 feet above ground level, with the engine at a low to moderate thrust setting and without the use of afterburner (fixed wing). These

operational factors would mitigate disturbance. I would expect F-35A aircraft to use the same methodology on the current visual arrival route.

11 Paragraph 18

As the Council is aware, Lakenheath is the home of the US Air Force (USAF) at RAF Lakenheath. The USAF flies F-15s and helicopters daily over the parish, creating excessive noise and vibration and emitting, on occasions, after burn jet fuel air emissions. The USAF intends to intensify its operations at Lakenheath from 2020 onwards with the arrival of 2 F-35 squadrons, so these environmental effects will crease as intensification of RAF Lakenheath proceeds.

Response

11.1 It should be noted that all jet engines, including those on civilian airliners, emit a very small amount of unburnt fuel during normal operations. A significant increase in exhaust emission does not occur through the presence of unburnt fuel when using an afterburner on fighter aircraft. However, since fuel flow is increased by a factor of two to three times, when in afterburner, there will be a proportionate increase in unburnt fuel as the total products of combustion in the exhaust increase proportionally. Although there is an increase in unburnt fuel when aircraft are using re-heat two factors should reduce the amount of unburnt fuel from the F-35A when compared to the F-15s. Firstly, the engines fitted to the F-35 are the latest generation and therefore more efficient and secondly, under current plans there will be less aircraft operating when the F-35A's have replaced the F-15s.

11.2 The reference to daily flying over the parish, creating excessive noise and vibration appears to be a generalisation covering the local area. The proposed development site, by virtue of its geographic position in relation to the runway orientation, is such that any overflying aircraft would be at a relatively low airspeed and engine power setting and not requiring the use of the afterburner.

11.3 It is recognised that most noise is generated by departing aircraft and not arriving aircraft. Instrument departures (IFR) direct aircraft to the west of the existing build up area of Lakenheath and thereby 'significantly' west of the proposed development. Consequently, I would expect to find that there would be less noise from fixed wing aircraft than that presently experienced by the current inhabitants of the existing built up areas of Lakenheath village.

11.4 'Intensification of operations' at RAF Lakenheath following the closure of RAF Mildenhall could be a factor in the future. However, should this be the case, any increase in operations externalities would be unlikely to be specific to the proposed

development and would be borne across by the whole parish. However, with the anticipated reduction in the number of aircraft based there I do not foresee an 'Intensification of operations'.

11.5 The research I have carried out and contained in Appendix 5, downloaded from the RAF Lakenheath web site, indicates that the base is the location of the USAF 48th Operations Group which comprises of three F-15 Squadrons and 2 Helicopter Squadrons. At the date of writing this Report I cannot confirm the number of F-15s on each squadron but it is most likely between 18 and 24 aircraft giving a total of between 54 and 72 aircraft.

11.6 Further research shows the U.S. Air Force has chosen RAF Lakenheath as its first base for the F-35A in Europe. The first aircraft are due to arrive in 2020.

11.7 Two squadrons, each with 24 F-35As, will be based at RAF Lakenheath replacing the three squadrons of F-15s currently based there.

11.8 Therefore, there will be a reduction in the number of fast jet aircraft based at RAF Lakenheath once the three F-15 squadrons have been replaced by two F-35 squadrons.

11.9 At the date of writing this Report I have seen no evidence that the USAF intends to intensify its fast jet operations at RAF Lakenheath. It is my opinion that with the reduction from 3 to 2 fast jet squadrons operations will decrease.

12 Paragraph 19

In recent discussions the Parish Council has had with the Base Commander, he has confirmed that jets' return flight path is directly over the Station Road development site to the north of the parish settlement and directly overhead the site of the proposed school. The attached map illustrates the flight path in relation to the development proposals. OR 212 confirms that there is no noise assessment for the application and relies on the August 2014 assessment for a different scheme at a different location.

Response

12.1 At the time of this Report, we are not aware of the detail of the discussions which took place between the Parish Council and RAF Lakenheath Base Commander.

12.2 The visual arrival route on page 8 of Appendix 3 indicates the fighter aircraft return path intercepts the runway at right angles whereas the attached maps indicate that the return path may be west of the actual return path. In my view the distance between the two depicted flights would only be small. Accordingly, it is reasonable to conclude that the proposed development north west of the airfield would be subjected to a similar noise level currently experienced by the residents of Lakenheath village. However, fast jet aircraft using the visual arrival route would be above 2000 feet with a reduced power setting and it would be for an acoustic expert to determine the actual levels of noise experienced.

12.3 In our opinion there will be no increase in noise from that currently experienced in the vicinity of the proposed development as a result of aircraft using instrument approach procedures to RW 06 or 24.

12.4 I am not in a position to comment on the last sentence of paragraph 19 in the Letter.

13 Paragraph 20

In our 25 January 2016 letter, para 27, we drew the Council's attention to the Occupational and Environmental Medicine Wing report that advised the existing noise and vibration report is out of date because the MOD has changed technical standards in light of the change in flight contours over Lakenheath. We sought confirmation from the Council that an updated report on noise and vibration would be available prior to determination of the application and this has not happened, despite the conclusion at OR 278 that the development proposals would be impacted adversely by noise from aircraft and "This is not capable of being fully mitigated and the external areas (e.g. garden spaces, public open spaces and school playing fields) would be particularly exposed to the effects of aircraft noise." The information about USAF operations is in the public domain and we have given the Council very specific information to act on but *this has not been dealt with in the OR, which states (OR 214) that there has been no assessment of the changes to operations at RAF Lakenheath. The lack of any noise assessment, and in particular, one that meets the changed technical standards of jet fighter noise overhead residential and school development is inexcusable The Council has been aware for over a year that major changes will take place in relation to the USAF operations at Lakenheath when USAF operations at Mildenhall cease. This has been recently confirmed with public comments from Cllr James Waters announcing confirmation of the closure of RAF Mildenhall on 18 January 2016*

Response

13.1 I believe that the report to which this refers is OEM/47/15 dated October 2015. The report was prepared to present the noise contour levels in the vicinity of RAF Lakenheath and RAF Mildenhall based on results of a previous environmental study using modelling. The contours are derived from criteria defined in the non-statutory Noise Amelioration Scheme (Military) and broadly follow those for Heathrow, Gatwick and Stansted.

13.2 The contours define the regions where noise amelioration scheme compensation is available to affected applicants (properties / residents) in the vicinity of the airfield. The criteria are related to contour values of 16 hours equivalent average sound pressure ($L_{Aeq,16hr}$) of 72, 66 and 63dB(A) and recommends that the 72 and 66 dB ($L_{Aeq,16hr}$) contours be used as the basis for the NAS(M) at RAF Lakenheath and RAF Mildenhall.

13.3 The report does not include the 63 dB (A) contour and there is a recommendation within the report that the 72, 66, and 63 dB $L_{Aeq, 16\ hr}$ contours should be produced for both RAF stations using the approved software package. Inspection of the contours shown, and regarding the relative positions of noise contours for other UK major airfields, it is reasonable to conclude that the 63dB(A) contour does not run north of Station Road, however, running the appropriate software will confirm the justification or otherwise of this conclusion.

13.4 At the date of this Report, I have not been able to investigate if there have been any changes to RAF Lakenheath's operational procedures referred to in paragraph 20 of the Letter. If Appendix 3 dated 2012 is indicative of current procedures at RAF Lakenheath then there will have been no changes.

13.5 When RAF Mildenhall ceases operations that there may be an opportunity for RAF Lakenheath to alter both its instrument and visual operational procedures. Such changes, co-ordinated with the local community, could result in better management of the externalities of aircraft operations as a whole across the Parish.

13.6 It would also be possible to alter the visual arrival and departure routes and patterns that aircraft currently use with the freeing up of the airspace currently used by aircraft based at RAF Mildenhall.

13.7 With the closure of RAF Mildenhall a large area of airspace will be freed up resulting from the removal of ATC procedures from the base. This in turn will enable changes to the RAF Lakenheath procedures that if made, should result in the removal or dissipation of concentrated areas of noise.

13.8 One change that could be made is for the current arrival route from Point C, over the village of Lakenheath and the proposed development, to be changed.

13.9 In summary, I would expect there to be an assessment of all the current ATC procedures at RAF Lakenheath in preparation for the closure of RAF Mildenhall. It is likely that this assessment and any changes would be done in consultation with the local population and their representatives. The aim would be to make better use of the airspace around the base for the benefit of the USAF and the local inhabitants living in the vicinity. However, as I note in paragraph 14.4 below I have not seen any evidence of any proposed changes to the flight paths. Furthermore, I would not expect any assessment to be made until closer to the planned closure date of RAF Mildenhall.

14 Paragraph 21

For the reasons explained above, the Council must comply with the MOD recommendation to consider the change in flight contours and must require the applicant to provide a noise report in line with the predicted noise contours before a decision on this application is made by the committee. The failure to do so would be a serious error of law in relation to consideration of material information in the circumstances outline above.

Response

14.1 These comments and observations are based on our general knowledge of military and civilian aviation as professional pilots and as a flight test engineer with many years' experience of flying military and civilian aircraft.

14.2 The closure of RAF Mildenhall might enable changes to the operating procedures to be made at RAF Lakenheath since the intersection of the extended centrelines of RAF Lakenheath runway 24/06 and RAF Mildenhall runway 29/11 will no longer be an issue.

14.3 From consideration of the shape of the combined RAF Lakenheath / RAF Mildenhall noise contours, in the Operational and Environmental Medicine Wing report, the noise levels to the west and south west will be reduced when RAF Mildenhall closes. It therefore follows that, if RAF Mildenhall is closed and RAF Lakenheath procedures remain the same, the 16 hour average noise level in the local area surrounding the proposed development can be reduced.

14.4 I have seen no evidence (unless this is a product of RAF Mildenhall closing) of planned changes to existing flight routes for RAF Lakenheath. Both arrival and departure routes are to the north east and south west of RAF Lakenheath and specific instructions to aircraft are made concerning noise abatement on departure and the avoidance of overflying Lakenheath village. Therefore, because the runway 06/24 is orientated towards the north east and south west, with the proposed development to the north west of the airfield we do not expect there will be any change to the current noise levels experienced in the vicinity of Lakenheath village, or the proposed development area. However, with the reduced number of F-35s arriving in 2020 to replace the F-15s it is possible that noise levels may reduce.

15 Paragraph 22

The updated information must be taken back to the committee for the reasons explained above, and it would be a breach of the Council's Constitution for the officer to exercise his judgment on the acceptability of the noise impacts.

Response

15.1 This matter refers to the Council's Constitutions and procedures and is outside the expertise of the authors of this Report.

16 Paragraph 23

Finally, in relation to noise impacts, counsel has also advised that given the noise impacts of the military planes on external areas of the proposed residences and the play area of the school will be severe and unmitigated, they may also constitute a breach of World Health Organisation guidance and yet appear to be wrongly dismissed by the officer and "public health and housing team" - see OR 278 and 34. To the extent the impacts may be experienced by vulnerable children, this could also be a breach of the Human Rights Act.

Response

16.1 This is outside the expertise of the authors of this Report.

General Comment

16.2 Our investigations have not been able to identify guidance from the World Health Organisation concerning noise impacts of military aircraft on schools or residential areas. It is noted that Lakenheath Community Primary School, which lies at approximately 2km (1.24m) to the west north west of RAF Lakenheath is closer to the RAF Lakenheath's runway than the proposed new school in the development area. The proposed new school is likely to experience less noise from departing and arriving IFR flights as it is further from the airfield than the exciting school. As the proposed new school is under or close to the existing visual arrival route it will experience similar or equivalent noise levels to the existing school when aircraft use the visual arrival route.

17 Paragraph 24

Related concerns arise in relation to air safety and we drew your attention to our concern that SCC Education does not seem aware of these concerns. Can you confirm that SCC Education fully appreciates that the proposed primary school is affected by noise and jet vibration but that the proposed school site is under the flight path of the fighter jets that fly in pairs on this flight path when returning to the base.

Response

17.1 The SCC Education or Forest Heath District Council will be able to comment on the assertion that they do not seem to be aware of air safety concerns.

17.2 It is not clear to us what concerns arise in relation to air safety as the fighter aircraft passing overhead, in the vicinity of the new development, will be above 2000 feet at a reduced or reducing speed with a reduced power setting.

17.3 With the arrival of a new type of aircraft at RAF Lakenheath, such as the F-35, it is natural for concerns on the safety aspects of the aircraft to be raised. However the F-35A is a new generation fighter and like the Eurofighter/RAF Typhoon it benefits from the advantages of new technology and fly-by-wire computer avionic systems that are proving to be more reliable than the systems used in the aircraft they are replacing. The F-35 does have one engine, while the F-15 has two, but the technological advances made in the construction of an aircraft's engine, avionic and airframe, in my opinion, results in more reliable aircraft. I would therefore expect that over the life time of the F-35A its safety record will match or exceed that of the aircraft it is replacing.

18 Summary and Conclusions

18.1 In my evidence I have explained that:

18.1.1 The geographical position of the proposed development is such that it is unlikely to be subjected to aircraft operational disturbance greater than that which already exists in the parish.

18.1.2 Instrument departures and arrivals are distant from the proposed development.

18.1.3 Current visual arrival routes do exist via specific reporting points which result in flight over or in the vicinity of the proposed development. Aircraft conducting VFR flights mitigate the externalities of these operations by adherence to criteria concerning speed and height. However, with the closure of RAF Mildenhall it is conceivable that the visual arrival routes may be altered resulting in reduced externalities of aircraft operations.

18.1.4 Current visual departure routes for aircraft place height restrictions that keep them lower than necessary. When RAF Mildenhall closes I would expect these restrictions to be removed. The result of this change will mean that aircraft will be higher resulting in a decrease in noise on the departure route. It is also conceivable that the actual routes could also change or additional visual departure routes implemented resulting in reduced flights on the current route.

18.1.5 The current practices for VFR arrivals and departures, alongside circuit flying demonstrate an awareness by RAF Lakenheath as to its responsibility to mitigate operational nuisance in the local area. It is reasonable to assume that they would continue to act responsibly in the future.

18.1.6 The closure of RAF Mildenhall could result in 'modifications' to IFR and VFR routings which could in result in the better management of noise footprints in the local area.

18.1.7 Based on the research that I have been able to carry out, at the date of writing this Report, it is likely that there will be fewer F-35A aircraft operating from RAF Lakenheath than the current number of F-15C and

F-15E aircraft. This would result in a reduction in the average number of flights per day.

18.1.8 The conclusion in paragraph 18.1.7 above is based on information in the public domain. However, as noted in paragraphs 7.14 to 7.19 above I postulate a scenario whereby additional aircraft are based at RAF Lakenheath as a result of the current political situation on NATO's eastern borders.

18.1.9 From the research I have been able to carry out it is my opinion that the F-35 is comparable with regard to the noise it generates when compared to the aircraft it is going to replace. The evidence for this opinion is contained in Appendix 6. In addition, the Technical Appendix (7) on Noise (and vibration) provides the clear view that the proposed development (new homes and school site) is not likely to be any more affected by noise (and vibration) than the existing village.

[redacted]

Captain J D Griffiths

7 June 2016

Access Aviation Ltd, Pascal House, 55 Gatwick Road, Crawley, RH10 9RD

19 Appendices:

Appendix 1: The Letter dated 2nd March 2016 from Richard Buxton Environmental and Public Law to Gareth Durrant, Planning Officer Forest Heath District Council.

Appendix 2: Instrument Charts for RAF Lakenheath

Appendix 3: RAF Lakenheath – Notes to pilots

Appendix 4: Report OEM / 47 / 15 dated October 2015

Appendix 5: RAF Lakenheath Units

Appendix 6: F-35 Noise Measurement Executive Summary

Appendix 7: Technical Appendix on Noise (and Vibration).