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NOISE CONSIDERATIONS AT GENERAL AVIATION (GA) AERODROMES

1. Introduction

1.1 In acting as the CAA's focal point for aviation-related environmental complaints and enquiries, the Directorate of Airspace Policy is made increasingly aware of environmental issues associated with aerodromes and aircraft activity at the smaller end of the market. Whilst there is some evidence of the general public having environmental concerns related to emissions, by far the greatest number of enquiries received within DAP, in relationship to GA activity, are noise related. This paper examines some of the environmental issues associated with general aviation-focussed aerodromes, concentrating upon noise impact and local Noise Abatement Procedures (NAP).

2. Scope

2.1 This paper is aimed at providing best practice guidance to aerodrome and aircraft operators on minimising the noise impact of their operations on the local population. It also serves to provide members of the public with an explanation of the constraints and factors that must be considered by aerodrome operators when deciding on the noise mitigation measures that could be adopted. It does not cover other environmental issues such as visual intrusion, aircraft emissions and maintenance activities that may all contribute to the environmental impact of GA. Advice on these matters can be obtained through the General Aviation Awareness Council (GAAC) website: (www.gaac.co.uk).

3. Background

3.1 Whilst the CAA will ensure that air traffic procedures are safe and that environmental issues are considered in any airspace change proposal, it does not have legal powers to place restrictions on specific aerial activity for environmental reasons. Accordingly, the CAA works closely with the Department for Transport (DfT), which has general responsibility for aviation policy and aircraft noise matters, to help develop regulations and policies aimed at limiting to the minimum the environmental effects of aircraft operations. That said, the DfT is only directly involved in measures to ameliorate noise at 3 designated airports: Heathrow, Gatwick and Stansted, which fall outside the remit of this GA-focussed paper. Elsewhere, the Department expects civil aerodrome and aircraft operators to achieve a reasonable balance between their legitimate needs and those of the local community.

3.2 At a more provincial level, any development of an aerodrome site would be subject to local planning authority agreement. The planning consent process provides a local planning authority with the opportunity to impose any operating conditions that it considers appropriate to the proposed development through the application of section 106 agreements. However, under UK legislation, aircraft noise cannot be regarded as a statutory nuisance; Section 76(1) of the Civil Aviation Act 1982 states that:

"No action shall lie in respect of trespass or in respect of nuisance, by reason only of the flight of an aircraft over any property at a height above the ground

which, having regard to wind, weather and all the circumstances of the case is reasonable, or the ordinary incidents of such flight, so long as the provisions of any Air Navigation Order... [broadly, the regulations governing licensing, air-worthiness, rules of the air and air traffic control] have been duly complied with.”

Neither is aircraft noise covered by the Neighbourhood Noise Act 1996 or the Environmental Protection Act 1990. Therefore, outside the planning process, local authorities have no powers to restrict aviation operations purely on the basis of noise nuisance. That said, a number of local authorities have representation on aerodrome related consultative committees (related comment under Other Issues).

- 3.3 Notwithstanding safety related considerations, the configuration of local operating procedures at non-designated aerodromes (e.g. departure routes and training circuits) is a matter for agreement between the aerodrome operator and the aerodrome users. To that end, an aerodrome operator is able to design and publish NAPs on a voluntary basis and in consideration of environmental factors. These voluntarily applied NAPs form the basis upon which any aerodrome attempts to mitigate its environmental impact upon the local community.

4. Legislation – The Rules of the Air Regulations

- 4.1 All civil aircraft fly subject to the legislation of the Air Navigation Order (ANO) and the Rules of the Air Regulations (RoA). The RoA are diverse and it is not intended to replicate them in this paper. The full text may be found at www.caa.co.uk/docs/33/CAP393.pdf. However, some regulations, e.g. those related to ‘low flying’, are worthy of description as they have some environmental (noise) association. The following general statements are drawn from Rule 5 of the RoA and give some indication of the height limitations placed upon aircraft operators:

- Aeroplanes, including helicopters, are not permitted to fly over a congested area of a city, town or settlement¹ below a height of 1,000 feet above the highest fixed obstacle within a horizontal radius of 600 metres of the aircraft or below such height as would enable it, in the event of a power unit failure, to make an emergency landing without causing danger to persons or property on the surface.
- Away from congested areas, aircraft, including helicopters, are not permitted to fly closer than 500 feet to any person, vessel, vehicle or structure. (Note: this is a minimum distance, not a minimum height; the distance of 500 feet is measurable in any direction, not just the vertical.)
- All aircraft flying over a congested area of a city, town or settlement shall not fly below such a height as will permit, in the event of a power unit failure, the aircraft to land clear of the congested area. However, helicopters flying over a congested area are exempt from this land clear rule.

Crucially, the 500 foot requirement does not apply to aircraft whilst landing and taking off in accordance with normal aviation practice.

¹ The ANO (Article 155) defines a Congested Area as “an area of a city, town or settlement, which is substantially used for residential, industrial, commercial or recreational purposes”. In practice, local planning authorities would rule as to whether or not a particular location was ‘congested’ or not.

4.2 In certain circumstances, where it is appropriate, the CAA's Aviation Regulation Enforcement and Legal Departments will prosecute breaches of the RoA in the Magistrates and Crown Courts. However, there remains a requirement to provide a high level of positive evidence, particularly identification of the aircraft, details of supporting witnesses and confirmation of location, before the matter can be pursued.

5. Aircraft Noise Characteristics

5.1 Aircraft noise characteristics play a great part in the environmental impact of aviation activity. Light aircraft noise can be measured in the same way as noise from air transport, using LAmax, SEL, or Leq contours. In this context, standard dose-effect relationships can be applied to predict annoyance. This approach is recommended in PPG 24 Planning and Noise² although the use of Leq should not be relied upon solely for small aerodromes with relatively low levels of movements. However, there is some evidence to suggest that people may be more annoyed by general aviation operations at a given level. PPG 24 advises that "Local planning authorities should also be aware that in some circumstances the public perceive general aircraft noise levels as more disturbing than similar levels around major airports". This reaction is based largely on the tonal characteristics of light aircraft engines or the type of activity including:

- Circuit flying – repetitious, often at low altitude with aircraft audible for long periods
- Parachute and glider tugs – slow climb with low ground speed, often based on aircraft flying in a small radius around the airfield or drop zone, audible for long periods
- Aerobatics – erratic noise, engine start/stop, diving, repetitious
- Piston engines – perception that piston driven helicopters and fixed wing aircraft are more intrusive, especially on full power with low background noise levels. Specifically on helicopters, PPG 24 adds "Helicopter noise has different characteristics from that from fixed wing aircraft, and is often regarded as more intrusive or more annoying by the general public.

6. Noise Abatement Procedures

6.1 The fact that the vast majority of both licensed and unlicensed aerodromes voluntarily impose NAPs suggests that, in the round, aerodrome operators/licensees are highly conscious of the need to fit into the wider community, to be a good neighbour and, where possible, to mitigate the potential noise burden. Clearly, the problems caused by aerodrome activity will vary depending upon the location of the aerodrome in relation to concentrations of population; the aerodrome that is bordered by areas of high residential population will have a different environmental impact to one that is surrounded by countryside. That said, disturbance thresholds are liable to vary such that volume of activity and size on neighbouring population are not necessarily proportionate to the perceived noise nuisance; different communities have different expectations.

² <http://www.communities.gov.uk/documents/planningandbuilding/pdf/156558>

6.2 In reviewing related comment with the UK AIP and commercially available flight guides, the text that most often appears to be related to the avoidance of overflight of local area of habitation is along the lines of:

- “Pilots are requested to avoid the villages...”
- “Circuit traffic is to avoid overflight of all local villages.”
- “In any event avoid overflying...”

6.3 Perhaps the most effective method of noise mitigation is the fundamental design and adaptation of the published visual circuit. Whilst not routinely referred to as a noise abatement measure, a circuit that routes aircraft away from areas of population will have obvious benefits. Indeed many aerodromes employ the non-standard right-hand circuit to avoid overflight of areas of higher population in the immediate vicinity. A good example of how aerodromes can mitigate related noise problems through adaptation of the visual circuits is the way in which one particular airfield alternates the circuit direction on a 24hr basis, even employing 3 northerly circuits (outer, middle and inner) changing from one to another on an hourly basis. Such alternation of procedures does not reduce that noise overall, but is seen as a very successful method by which the ‘pain is shared’. In addition to the adaptation of lateral routing of the visual circuit, many aerodromes employ higher visual circuits than are, from a purely flying perspective, strictly required. The concept that an increase in the height of a visual circuit will reduce the noise impact is interesting, as an increased circuit height will mean a longer period when the aircraft must fly under increased power and possibly increase track miles. There does not appear to have been any scientific study undertaken to demonstrate that the overall impact of a higher circuit actually does reduce the overall noise penalty on the ground. Finally, environmental issues arise where GA activities combines with air transport activity where, for example, light aircraft have to ‘fit in’ with larger commercial aircraft with resultant increase in holding and delays in the visual circuit.

6.4 In mitigating either any perceived generic or a specific noise related problem, the associated procedures can vary greatly in complexity:

- Ground activity. Instruction to pilots concerning the positioning of aircraft during engine run-up checks:

“final power checks to be carried out at Holding Point Alpha only”.

- Simplistic NAPs that are commonly employed at aerodromes to help mitigate a very specific problem often refer to the avoidance of overflight of a particular building:
 - “...turn to runway QDM until passing prominent white building...”
 - “All departures from Rwy07 should turn right ... to maintain a track of 080 until clear of Fyfield village.” ”Rwy 07/25 – Downwind leg must be to the north of ... the large new house.”
- Providing generic direction to pilots related to timing of specific turns:

- “Keep circuits tight.”
- Departure routes following course of other features that generate noise:
 - “immediate right turn and follow line of M1.”
 - “...track 270 to the railway line.”

6.5 Examples of NAPs at aerodromes close to built up areas are often more complex and/or fundamental:

- “Pilots must obtain a (noise abatement procedure) briefing before Departure.”
- “Circuits restricted to based flying schools only.”
- “Noise abatement techniques should be practiced at all times.”
- “Pilots are to familiarise themselves with the Oxford Noise Amelioration Scheme...”

6.6 Taken as a snapshot review of published material available to all GA pilots, these are but a few examples of the ways in which aerodrome operators/licensees adapt procedures to mitigate the noise impact upon the local community. In all cases where geographical features are involved, it would seem evident that a supporting pictorial display of the routing involved produces obvious benefits. It is, however, difficult to objectively quantify the success of schemes on a specific basis, but it is evident that aerodrome operators (the local experts) value their worth and believe they go some way to balancing the needs of the aviation and local communities. However, it is not always possible for aerodrome operators to design NAPs in respect of areas where aircraft performance characteristics and operational requirements allow little latitude, especially in the immediate vicinity of the aerodrome. Moreover, noise abatement procedures remain subordinate to the safe conduct of flight and aerodrome operators must remain wary of implementing noise abatement procedures that increase the risks to both aircraft operators and the local population. Potential problems also arise for flying training activities in the visual circuit. Trainee pilots should be taught to fly visual circuits at any airfield by reference to the runway; the introduction of complicated NAPs can undermine this principle, and the increased circuit size associated with NAPs increases the possibilities of forced landings away from the aerodrome.

7. Compliance.

7.1 The publication of NAPs is one thing; the degree to which compliance is achieved or even monitored is quite different. Whilst monitoring of compliance is vital if the NAPs are to prove their worth, it can be difficult to achieve particularly when the procedure involves aircraft operating away from the immediate vicinity of the aerodrome, e.g. downwind. It follows that, notwithstanding the efforts of the aerodrome operator/licensee, the good neighbourliness rating of any aerodrome will actually depend upon the actions of the pilots, who are more likely to comply with NAP if the procedure itself is straightforward and easy to follow. To this end, the use of dominant geographical features is often fundamental to the effective success of a

procedure (Dept Rwy 28 turn left toward lake...) making the route easier to follow and monitor.

- 7.2 Perversely perhaps, compliance is often *de facto* monitored by the general public. If a circuit activity is not complying with any published NAP, the local community will invariably advise the aerodrome accordingly. By fostering an open relationship with the local community and providing guidance relating to the NAPs and the information required to initiate investigation (eg time, location, type of aircraft (eg white, high wing, single engine) and registration markings), aerodromes and communities can work towards the same goal³.
- 7.3 The fostering of an environmental consciousness throughout the indigenous flying community will also aid the task of monitoring compliance. Pilots who understand the importance of NAP compliance to the future of an aerodrome can, and do, police one-another.
- 7.4 In reviewing a portion of published material, it is evident that many aerodromes promulgate NAPs as mandatory instructions. Given that the requirement to follow any specific routing or even adapt standard operating procedures to mitigate local noise nuisance might increase the demand upon any pilot, it is possible that, without a suitable caveat related to any overriding flight safety requirement, an aerodrome operator might be exposed to legal challenge in the event of a related incident. It would seem that the instruction (aerodrome X) "...pilots are to avoid, *where there is no overriding training or flight safety requirement*, overflying local residential areas..." appears to be phrased so as to avoid this potential pitfall.

8. Sanction

- 8.1 Establishment of procedures and compliance monitoring lead to the inevitable question, 'what to do in the event of proven non compliance?' Whilst aircraft must operate in accordance with the Rules of the Air Regulations, the most relevant of which is Rule 5 – Low Flying, non-compliance with a NAP is a matter between the aerodrome operator/licensee and individual pilots. Similarly, without evidence of a breach of the Rules of the Air Regulations, it is up to the aerodrome operator/licensee to decide upon what sanction, if any, should be taken against any pilot found not to have complied with associated procedures. Clearly, ignoring non-compliance will not only negate the effectiveness of the procedure in the round, but will do little to encourage future compliance.
- 8.2 Conversely, taking action against errant pilots serves 2 very important goals. Firstly, the message to the local flying community is clear, 'stray from the procedure and action will be taken'; this will encourage more consistent compliance with the procedure. Secondly, taking sanction against those that do not comply with the aerodrome-imposed procedure gives a very clear message to the local community that the aerodrome is proactive in protecting its neighbours.
- 8.3 The degree of sanction is clearly a difficult issue; aerodrome operators/licensees will not, for financial reasons if nothing else, wish to routinely deny the use of the

³ The Wycombe Air Park publication "The Control of Aircraft Noise - Guidance for Residents in the Wycombe District" is a simply written, cheaply produced example of literature that might assist in enhancing the effectiveness of local NAPs and the aerodrome's perceived standing in the community.

aerodrome and its facilities. However, sanction is important, and it seems that the management at certain aerodromes strike a good balance in developing a rising scale of guidance culminating in penalty:

- 8.3.1 Should investigation provide evidence of non compliance without there having been any overriding reason for not following any NAP, in most cases an informal exchange with the relevant pilot has been shown to have the desired effect.
- 8.3.2 Should any pilot show a lack of understanding of the procedure, if appropriate they will be offered the opportunity to fly dual, with a resident flying instructor, who will demonstrate the airborne procedure, pointing out relevant land marks. Such a training sortie is offered at reduced rates.
- 8.3.3 Blatant or repetitive offences lead (perhaps twice yearly) to pilots being banned from operating at the aerodrome for periods of weeks or months.

9. Other Issues

- 9.1 It is a commonly held view that the general public's propensity to complain about aircraft noise has increased in recent years. That said, regardless of the aerodrome concerned, as would be born out by other organisations such as BAA, a small minority of individuals often generate a disproportionate number of complaints.
- 9.2 Based upon comments received by DAP's Aviation-Related Environmental Complaints Section there is evidence to suggest that to some degree local communities can become attuned to certain levels of activity and associated noise. It is the out-of-the-ordinary or new noise source that is more likely to cause concern. Experience has shown that the maxim 'fore warned is fore armed' holds true and the advanced promulgation of anticipated unusual peaks of traffic (night flying, fly-ins and flying displays for example) can prove beneficial to aerodrome operators/licensees and the local community alike.
- 9.3 Moreover, in terms of scale, the 'new' activity does not have to be a major operation to generate great local concern:
 - The recent AOC operation of a single helicopter over a four-day period from a temporary site at Minehead generated in excess of 250 complaints to various organisations⁴.

Indeed, there are examples where the removal of one particular noise source can result in increased concerns related to other pre-existing operations:

- Upon the closure of RAF Coltishall and the resultant absence of noise caused by the indigenous Jaguar force, the background noise generated by onshore/offshore helicopters routing within the Norwich area has generated increased public attention.
- 9.4 Aerobatics, whilst outside the control of most aerodrome authorities can be the source of considerable disturbance. When aerodromes cater for such activity in the overhead or perhaps within associated ATZ it is evidently important to rotate the

⁴ Approximate complaint count; CAA 30+, District Council 200, Town Council 12, Tourist Office 20, Hotels Association 20.

portion of airspace utilised. This practice is in line with the guidance provided within the General Aviation Awareness Council's 'Code of Practice for General Aviation'.

9.5 Over fifty aerodromes are required by Government to provide facilities for local consultation. In the majority of cases the aerodrome operator/licensee has established a Consultative Committee that meets regularly to consider matters concerning the management and administration of the aerodrome. Typically, noise issues are a fundamental element of the dealings of such committees. Whilst the CAA has no oversight of the effectiveness of such local consultation, it appears that Consultative Committees do provide a forum in which local concerns can be formally presented to the aerodrome management.

9.6 Whilst outside the remit of this paper, White Waltham raised the issue of property searches and explained that, given that many complainants, regardless of the aerodrome in question, were newer to the area than the aviation activity, White Waltham had approached the local Council suggesting that potential buyers should be encouraged to initiate a property search related to aviation issues as part of the normal searches routinely undertaken. The Council were apparently not in a position to take the proposal forward, however it raised the topic of the searches conducted upon request by DAP's Aviation-Related Environmental Complaints Section. Notwithstanding that uptake has not been great, feedback related to the usefulness of the service has been generally positive.

10. Conclusion

10.1 From this snapshot review of environmental issues related to GA-focussed aerodromes it is evident that noise is the main topic of concern and that aerodrome management organisations are generically highly conscious of concerns held within the local community. Given the growing 'green-consciousness' of local communities, including local government, it is increasingly important that the GA community considers its environmental impact and if possible, subject to overriding safety considerations, adapts activities and procedures accordingly. Whilst most aerodromes employ NAPs of some description, monitoring of compliance and appropriateness of sanctions are difficult issues. Community involvement in the observation of compliance, perhaps fostered through an open relationship with the local residents, using the Consultative Committee and local council as appropriate, can have clear benefits. Equally, being seen to take action against individual pilots who fail to comply with promulgated NAPs is vital to establishing and maintaining a confidence-enhancing relationship with the local population. Promulgation of anticipated unusual levels of activity may placate concerns related to short-term peaks of disturbance.

11. Best Practice

11.1 Notwithstanding the nature of this review and paper, the following points are offered as CAA best practice guidance in respect of noise abatement issues at GA-focussed aerodromes. Aerodrome operators/licensees should:

11.1.1 Take the matter of noise impact seriously and be seen, subject to overriding safety considerations, to be attempting to protect their neighbours from the environmental impact of aerodrome related operations.

- 11.1.2 Notwithstanding overriding flight safety constraints, and with due consideration of the experience and expertise of the indigenous flying community, consider adaptation of local procedures such as published aerodrome patterns and practices to mitigate the environmental impact of aerodrome operations upon the local community.
- 11.1.3 Take action to minimise the impact of ground operations.
- 11.1.4 Aim to foster an open relationship with the local community, providing details of NAPs and ways in which members of the public can assist in the monitoring of compliance.
- 11.1.5 Be prepared to sanction, on a sliding scale, individual pilots who are found to have unnecessarily failed to comply with locally implemented NAPs.
- 11.1.6 Assist inexperienced pilots, those unfamiliar with the aerodrome and repeat offenders to facilitate a better understanding of local noise issues and associated NAPs.
- 11.1.7 Consider promulgating within the local community any anticipated future unusual flying activity that might, even in the short-term, precipitate an increased noise burden describing how the impact has been mitigated to the greatest extent possible.

Civil Aviation Authority