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The importance of collaborative dialogue in the aircraft noise debate: Examples of flightpath changes at UK airports

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Abstract

Aircraft noise remains one of the most socially contentious aspects of air transport operations and the one that is most likely to motivate local community opposition to airport expansion and development. Identifying the complex and often interlocking socio-political and acoustic factors that underpin this opposition represents a key management challenge for airports. Learning how to disseminate information to affected groups about current and future noise exposure levels in a way that is equally understandable and comprehensive, and empowering communities to work with airport operators and aviation regulators to refine possible noise mitigation options are both prerequisites for achieving more socio-environmentally equitable and sustainable aviation. Drawing on two examples of flightpath reorganisation at UK airports, this paper shows that establishing and maintaining effective collaborative dialogue between airports, airlines, aviation regulators and local communities will help to overcome some of the communication breakdowns that have strained some airport–community relations in the past. By examining the benefits, challenges and opportunities associated with this approach, the paper offers a new framework for collaborative working and makes recommendations for improved practice.

Keywords

aircraft noise, airports, flightpaths, community opposition, collaborative dialogue

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PRINCIPAL MANAGEMENT IMPLICATIONS

- Identifying, understanding and mitigating the local socio-environmental impacts of air transport operations are high on political, public and industry agendas and airport operators have a duty to address them.
- Aircraft noise is one of the most socially contentious aspects of aircraft operations and it is likely to remain a focal point of local opposition to airport activities.
- Perceived lack of transparency and opportunities to influence the outcome of development proposals can lead to local community resentment, frustration and hostility.
- Hostile communities create public relations challenges for airports and have the potential to constrain growth.
- Airport operators must establish and maintain effective and collaborative dialogue with all affected groups and learn how to improve ways to inform and manage public expectations.
- Effective collaborative dialogue can yield long-term positive outcomes for airports and local communities.
- There is an urgent need for industry practitioners and academics to work together to deliver new empirically informed research that examines the social perceptions of aircraft noise and advances policies for sustainable aviation.

INTRODUCTION — THE AVIATION SUSTAINABILITY CHALLENGE

Commercial air travel has become an increasingly emotive subject in the UK in recent years. The debate surrounding who should benefit and, perhaps more importantly, who should suffer the social and environmental impacts of aircraft noise along with airport expansion has had a

long political pedigree both globally and within the UK. This controversy appears to be intensifying as liberalisation and increased competition within the air transport sector depresses the cost of airfares, generates additional demand and has led to an increase in the number of flights. Globally, demand for air travel is expected to increase by 5–6 per cent per year, partly due to rapid growth in China, India and Latin America.¹ In the UK, passenger numbers have increased almost threefold in the last 25 years to the point where 219 million passengers used UK airports in 2011.² Current forecasts of UK air travel demand indicate that, if there are no capacity constraints, demand will rise to 345 million passengers per annum (mppa) by 2030 and to 400–700 mppa under central forecasts by 2050.³

While commercial aviation facilitates the routine international mobility of over 2 billion passengers and millions of tonnes of airfreight per year, its growth has resulted in a number of increasingly negative externality effects. Capacity constraints on the ground and in the air, while varying spatially in their severity, combine to cause delays that cost the global economy billions of US dollars every year in lost productivity.⁴ At the same time, concerns about the local and global environmental impacts of air transport operations are increasingly featuring in public and political debates and influencing national and international air transport policies.⁵

In the UK, the situation in London and South-East England is particularly acute. Here, six commercial airports — London Heathrow, London Gatwick, London Stansted, London Luton, London City and London Southend — annually handle over 134 million passengers (61 per cent of the national total) on seven runways.⁶ In comparison, Amsterdam's Schiphol

Airport has six runways on one site and Paris' Charles de Gaulle has four. Both Heathrow and Gatwick are currently operating close to their maximum design capacity and any disruption to normal traffic flow resulting from bad weather, a technical problem, security incident or industrial action results in serious deteriorations in schedule performance.

In the 12 months to the end of May 2012, Heathrow handled 70 million passengers (31.8 per cent of the UK total) on its two runways, while Gatwick (the world's busiest single-runway airport) handled a further 33.8 million.⁷ Within inner London, the expansion potential of London City airport is limited by its short runway, its dockside location, its steep approach and its proximity to residential areas which limit its hours of operation. Although Stansted, Luton and Southend airports on the periphery of London's conurbation have sufficient infrastructure to accommodate some additional traffic, legacy airlines continue to concentrate their operations at Heathrow and Gatwick on account of their historical importance, slot value and higher levels of international connectivity that are conferred by alliance groupings. These factors combine to render Stansted, Luton and Southend unattractive to aligned full-service airlines, which practise hub-and-spoke operations, but ideal for the short-haul point-to-point low-cost and charter carriers which have established services there.

In addition to supporting some of the most capacity-constrained airports in the UK, the skies over London and the South-East contain some of the most complicated and dense air traffic sectors in the world. Approximately 2.4 million commercial aircraft fly through UK airspace every year and the skies above London and the South-East have to

accommodate aircraft arriving at, and departing from, London airports, traffic flying between UK regional airports and continental Europe, and services flying from mainland Europe and the Middle/Far East to North America. Increasingly, demand is outstripping the capacity of certain UK airports and the surrounding airspace, a situation which results in delays and increased fuel burn, fuel costs and emissions as aircraft are forced to fly holding patterns before landing.⁸ This mismatch between supply and demand is driving the development of new airports, runways, terminals and flightpaths in the region. But the provision of new or expanded aviation infrastructure is controversial and is frequently met with vociferous opposition by local communities on the ground and by national environmental groups that believe the proposals would adversely affect the local and global environment.

Historically, community opposition to airport development has been articulated with reference to local issues including loss of tranquillity, increased exposure to aircraft noise, concerns about property devaluation, the human health impacts of increased noise and air pollution, land take, landscape despoliation and damage to local biodiversity. More recently, these concerns have been supplemented by anxiety about aviation's contribution to global climate change. Of these issues, aircraft noise is recognised as being one of the most immediate and challenging issues for airports.⁹ Acoustic disturbance and annoyance thresholds are notoriously subjective and difficult to quantify as aircraft noise brings local socio-environmental concerns into conflict with national economic priorities. In addition, local communities may have unrealistic expectations of the levels of noise reduction that can be achieved, while the ability

of airport operators to control aircraft noise may be limited by existing regulatory and safety regimes. This complex framework has often resulted in frustration and annoyance which has manifested itself in the form of local community protest groups that seek to mitigate the effects of current airport operations and/or limit future expansion.

In recognition of the complex challenges associated with both managing and addressing social perceptions of aircraft noise, this paper evaluates the potential of collaborative dialogue as a mechanism for improving airport–community relations. It begins by examining local motivations for, and responses to, aircraft noise. This is followed by a description of the techniques that are used for measuring aircraft noise and a discussion of their benefits and limitations. Two contrasting examples of flightpath reorganisation in the UK are then provided to illustrate the importance of establishing effective collaborative communication between airports, regulators and local communities. The paper explores how this approach may contribute towards the development of a framework for more collaborative working and concludes by making recommendations for improved practice.

FIGHTING THE FLIGHTS — COMMUNITY OPPOSITION TO AIRCRAFT NOISE

Aircraft noise has long been recognised as one of ‘the most socially objectionable aspects’ of air transportation, and numerous academic studies have attested to the fact that airport communities are sensitive to noise disturbance.¹⁰ While individual residents have complained about the noise from aerodromes since the 1920s, more formalised anti-airport noise groups did not emerge until the early 1950s following

the introduction of larger and noisier passenger aircraft. By 1958, the acoustic climate around London Heathrow had deteriorated to such an extent that the British Government imposed take-off restrictions, introduced limitations on night flying and stipulated the precise departure and arrival routes that all outbound and inbound aircraft must fly.¹¹ These standard departure and arrival routes were designed to route aircraft (and their noise) away from the most densely populated areas by stipulating the precise headings, altitudes and speeds that must be flown.

Despite the introduction of such mitigation measures, the introduction of progressively larger and heavier jet-powered aircraft during the 1960s increased community opposition to airport operations as the ‘high-pitched squeal of jet engine turbines’ was deemed ‘far more uncomfortable to the human ear than the growl of conventional piston engines’.¹² The UK’s first anti-airport noise group — the Kew Association for the Control of Aircraft Noise — was formed in 1966 to try and reduce Heathrow’s acoustic impact.¹³ Other anti-noise groups were established around Luton, Birmingham and Manchester airports under the auspices of the British Association for the Control of Aircraft Noise (BACAN, an organisation related to the Local Authorities Aircraft Noise Council).¹⁴ By 1973 it was estimated that 2–3 million UK residents suffered from ‘the distinctive roar and high-pitched whine of jet airliners landing and taking off’, a ‘peculiarly oppressive sound’ which had ‘to be lived with to be truly resented’.¹⁵

As a consequence, aircraft noise developed into a highly contested moral and geopolitical issue and, from the 1970s onwards, became firmly placed at the forefront of international and domestic

debates about air travel and airport expansion.¹⁶ Anti-noise campaigns became a recurring feature at airports around the world, including Barcelona,¹⁷ Canberra,¹⁸ Madrid,¹⁹ Tokyo Narita,²⁰ Frankfurt,²¹ Boston Logan,²² Amsterdam²³ and Sydney.²⁴ Indeed, the cultural resonance of the issue is such that an anti-airport noise campaign featured in Arthur Hailey's famous 1968 novel 'Airport', and the annoyance caused by changes to flightpaths at Springfield International Airport was memorably depicted in an episode of *The Simpsons*.

REGULATING AND MONITORING AIRCRAFT NOISE IN THE UK

In the UK, aircraft noise is governed through international, European and national legislation. At an international level, Annex 16 of the 1944 Chicago Convention enables the International Civil Aviation Organization (ICAO) to set progressively tighter noise certification standards for sub-sonic civil aircraft which ban the noisiest aircraft.²⁵ Additionally, the ICAO Assembly through Resolution A36-22 has developed a 'balanced approach' to aircraft noise management. This prioritises noise management using four principle elements:

- reduction at source (quieter aircraft);
- land-use planning and management;
- noise abatement operational procedures; and
- operating restrictions.

The European Union (EU) also has (albeit limited) powers to regulate aircraft noise emissions. Through the Operating Restrictions Directive 2002/30, the balanced approach is adopted into European law. From 2007, European Environmental Noise Directive 2002/49 compels EU

member states to publish detailed noise maps from which the acoustic impact of airport operations on local communities can be assessed. Following this, in 2011 the European Commission launched the 'Better Airports Package', which proposes to repeal directive 2002/30 and to harmonise EU rules on aircraft noise management.

On a national level, Section 9(1) of the UK's Air Navigation Act 1920 protects the airline industry from anyone wishing to take action against it for nuisance resulting from aircraft noise,²⁶ a policy reaffirmed in Section 76(1) of the Civil Aviation Act 1982. Additionally, the Environmental Noise (England) Regulations 2006 (as amended) turn EU directive 2002/49 (Environment Noise Directive) into UK law. These regulations place a duty on the Secretary of State to produce strategic noise maps and oblige airport operators to produce noise action plans. Although UK local authorities have the power to impose noise controls on some transport infrastructure, including railway stations, wharves and garages under Section 63 of the Control of Pollution Act 1974, it is believed that noise from aircraft in flight would probably 'not be regarded as noise from premises' and so these powers have never been applied; however, certain administrative mechanisms enable selected UK airports to be 'designated' under Section 78 of the Civil Aviation Act 1982 'for the purpose of avoiding, limiting or mitigating the effect of noise and vibration'²⁷ connected with aircraft operation. Designation empowers the UK Government, among other things, to specify initial aircraft departure routes from airports, set departure noise limits, enable night movement and noise quota limits to be introduced and require regular performance reporting with stakeholders; however, such powers are used sparingly and, at the

time of writing (August 2012), only Heathrow, Gatwick and Stansted have been designated under the provisions of this Act.

The alternative option for UK local authorities is to agree binding planning commitments or obligations in respect of granting permission for airports to expand. These conditions are usually applied through Section 106 of the Town and Country Planning Act 1990. These obligations can cover a range of operating restrictions or monitoring regimes around aircraft noise. Stansted Airport, for example, had to construct a new aircraft engine test facility as part of gaining its planning permission to increase passenger numbers beyond 15 million per annum.

With all this in mind, UK airport operators are becoming increasingly mindful of the need to be 'good neighbours' and many have proactively introduced noise mitigation schemes, such as the provision of discounted home insulation and double glazing, and invested in more sophisticated and automated noise and track monitoring systems. These systems identify any aircraft that exceeds the maximum permitted noise limit and/or deviates vertically or horizontally from prescribed routes. Typically, the airline concerned is then fined for the breach and the proceeds paid into a fund which supports local community projects. Yet, despite such interventions, aircraft noise remains a highly subjective and contentious phenomenon with individuals exhibiting different degrees of tolerance towards it. Although exposure to aircraft noise is known to cause a range of psychological and physiological effects (including increased blood pressure and noise-induced sleep disturbance), the severity of them is influenced by an individual's age, their general health, social conditions, lifestyle characteristics and the time of day when the noise event occurs.²⁸

One of the challenges associated with monitoring aircraft noise is that there are over 18 different methodological techniques that can be adopted to quantify it but no universally accepted approach.²⁹ Until 1990, the official technique for measuring aircraft noise in the UK was the 'Noise and Number Index' (NNI). This calculated the number of noisy events and the maximum sound level at any given location but failed to take into account the duration of individual noise events. This system was superseded by the more sophisticated, but still controversial, World Health Organization-approved technique which assesses the frequency and timing of aircraft movements, the maximum sound level (in decibels) and event duration. Under this system, aircraft noise is measured with reference to a logarithmic A-weighted decibel scale, dB(A), which enables an average sound exposure level over a given period of time to be calculated. Under this regime, a L_{eq16hr} of 57dB(A) indicates that the acoustic energy is equivalent to a constant noise level of 57dB(A) over 16 hours.

The 57dB(A) L_{eq} noise contour is used by the UK Government to indicate the onset of 'significant community annoyance' after a 1985 study indicated a strong correlation between this noise level and community disturbance.³⁰ In this context, annoyance has been defined as 'a feeling of depression, resentment, anger, displeasure, agitation, discomfort, dissatisfaction, distraction, helplessness, or offence which occurs when an environmental factor interferes with a person's thoughts, feelings, or activities'.³¹ The UK Government acknowledges that the relationship between aircraft noise and annoyance is inexact and that 'the mix and types of aircraft, their frequency of overflight, the social and economic circumstances of affected people and general levels of

Table 1 Changes to designated airports' 57dB(A)_{L_{eq}} 16-hour noise contours, 1988 versus 2011

<i>Airport</i>	<i>1988</i>			<i>2011</i>		
	<i>Number of aircraft movements</i>	<i>Area of 57dB(A) contour (km²)</i>	<i>Population within 57dB(A) contour</i>	<i>Number of aircraft movements</i>	<i>Area of 57dB(A) contour (km²)</i>	<i>Population within 57dB(A) contour</i>
Heathrow	352,000	331.0	591,400	480,906	108.8	243,300
Gatwick	199,000	231.4	48,500	251,067	40.4	3,060
Stansted	47,000	30.5	1,200	148,317	1.2	1,300
Totals	598,000	592.9	641,100	880,290	170.4	247,660
<i>Airport</i>	<i>Absolute change (2011 v 1988)</i>			<i>Percentage change (2011 v 1988)</i>		
	<i>Number of aircraft movements</i>	<i>Area of 57dB A contour (km²)</i>	<i>Population within 57dB A contour</i>	<i>Number of aircraft movements</i>	<i>Area of 57dB A contour (km²)</i>	<i>Population within 57dB A contour</i>
Heathrow	128,906	-222.2	-348,100	36.62%	67.13	58.86%
Gatwick	52,067	-191.4	45,440	26.16%	82.54	-93.69%
Stansted	101,317	-9.3	100	215.57%	30.49	8.33%
Total	282,290	422.5	393,440	47.21%	-71.26	-61.37%

Source: Department for Transport (2012) 'Noise exposure contours for Heathrow, Gatwick and Stansted airports', available at: <http://www.aft.gov.uk/publications/noise-exposure-contours> (accessed 20th October, 2012).

environmental awareness and sensitivity' will determine the extent of disturbance.³² The UK Government is currently exploring options to improve the use of noise contours or other measures to describe the noise impact.³³ As a consequence, opponents argue that the current methods used to measure noise disturbance are flawed and suggest that, far from being easily quantifiable, annoyance is in the 'ear of the beholder'. Significantly, Department for Transport (DFT) data from annually published noise contours for the three UK designated airports indicate that both the spatial extent of the 57dB(A) noise contour and the number of people living within it have been significantly reduced between 1988 and 2011³⁴ (see Table 1).

While significant reductions in noise exposure have been obtained as a result of airport management teams becoming increasingly aware of the acoustic impact of aircraft operations and taking steps to

proactively monitor and reduce noise through voluntary noise abatement procedures, they have not always been quick to appreciate the implications of diverse social perceptions of aircraft noise on their operations or always understood how best to manage them. These are serious omissions which, as the next two case studies demonstrate, have the potential to adversely affect an airport's relationship with its local community.

CASE STUDY 1: AIRSPACE CHANGE AT EAST MIDLANDS AIRPORT

East Midlands (EMA) is a regional airport situated in a predominately rural part of the county of Leicestershire in central England. The airport's catchment area includes the three cities of Leicester, Derby and Nottingham and their immediate surroundings. In 2011, EMA handled 4.2 million passengers³⁵ on a range of

full-service scheduled, low-cost and charter services to predominately European and North African destinations, and was the largest pure freight airport in the UK.³⁶ In October 2003, the airport submitted an airspace change proposal (ACP) to the UK's national aviation regulator, the CAA, to extend the area of controlled airspace around the airport and reorganise the way in which air traffic movements to and from the single runway were handled to increase capacity and improve safety. The plans involved amending existing approach and departure procedures to the north of the airport and rerouting all inbound aircraft approaching the airport from the south to the east of Leicester city, as well as relocating one of the existing holding areas (or stacks). Although the plans were broadly welcomed for lessening the acoustic impact of aircraft operations on settlements in west Leicestershire and southern Derbyshire, a number of residents in east Leicestershire, who found themselves under the rerouted flightpaths, mobilised against the plans, believing they would cause unacceptable levels of noise pollution which would have a detrimental effect on their health and on local property prices.³⁷

Following a public meeting in January 2004, an anti-airspace change campaign group — East Leicestershire Villages Against Airspace (ELVAA) — was formed. ELVAA's aim was to 'limit the noise blight resulting from [EMA's] commercial activities for the benefit of all residents in Leicestershire'; a situation they believed could best be served by preserving the existing airspace structure.³⁸ ELVAA disputed EMA's claim that 75 per cent fewer people would be subject to aircraft noise and alleged over 100,000 new people actually would be affected. One of the most contentious aspects of the ACP was EMA's continued unrestricted 24-hour

operating licence and its significant night-time freight operation which would result in cargo aircraft flying over rural parts of east Leicestershire in the middle of the night. Although the CAA's Director of Airspace Policy accepted that 'having airplanes flying at 2 am over your house can be socially quite intrusive', he emphasised the importance of balancing the local noise impact with the regional and national economic benefits the airspace reorganisation was forecast to deliver.³⁹

On 29th July, 2004, the CAA approved the ACP and implementation was scheduled for November 2004. As part of the formal consultation process, EMA was required to disseminate information about the proposal to all neighbouring local authorities where the proposed base of the new airspace above them was 7,000 ft or lower and/or where residents might experience low-flying aircraft for the first time.⁴⁰ In August 2004, three months before the planned changes were due to take effect, a number of local councils claimed they had not been adequately consulted. As a result, EMA asked the CAA to halt implementation of the new airspace regime to allow for a second 12-week period of public consultation, which ran from 18th October, 2004 to 10th January, 2005.

In an effort to improve community relations, EMA printed 10,000 new information brochures, which contained maps and information about the plans, and hosted eight community road-show events in local community centres during November and December 2004 to disseminate more information about the proposals and give local residents an opportunity to discuss their concerns.⁴¹ These events were well attended and, while a small number of individuals exhibited passionate opposition to the plans, curiosity rather than fervent resistance

appeared to motivate the majority of attendees;⁴² however, in an e-mail to supporters on 15th November, 2004, the ELVAA chairman criticised the new information brochures for their alleged typographic errors, maps which avoided showing the true extent of the flightpaths and the perceived condescending way in which the information was presented.⁴³ As a result, relations between the airport and ELVAA deteriorated further. ELVAA accused EMA of secrecy while the airport alleged ELVAA was engaged in propagating 'serious inaccuracies' and 'alarmist' distortions about the plans.⁴⁴

Issues of trust, transparency and accountability were also raised by the local MP, Edward Garnier QC, who asked:

'Why does [EMA] not, unless pushed and pushed and pushed, provide us with the raw data that we need? ... Why are they reluctant unless made to do it? Why do they not behave with great candour and with frankness? It is much easier to deal with a person who tells the truth voluntarily than to have to extract the facts and information, like pulling teeth'.⁴⁵

Another commentator opined that EMA's reluctance to disclose the required information was due to the fact that 'we live under a culture of state secrecy ... based on the premise that those in authority don't have to tell us [the public], anything because they know what's best'.⁴⁶ Following the end of the second phase of consultation (which resulted in a number of amendments and concessions being made) the airspace change was approved for a second time and subsequently implemented in May 2005, despite continued opposition by some sections of the local community.

EMA's experience with the ACP highlights the important issue of trust between

the airport operator and the communities living around the airport. Crucially, while EMA was successful in liaising with, and undertaking all the regulatory requirements of, the CAA, EMA's communication with local residents and communities was arguably less effective and it was this fact that undoubtedly contributed towards much of the opposition it subsequently faced.

CASE STUDY 2: IMPROVING TRACK-KEEPING PERFORMANCE AT STANSTED

London Stansted Airport (STN) is situated about 40 miles north-east of central London in a rural part of the county of Essex. Its nearest neighbours are the town of Bishop's Stortford (population 35,000) and the villages of Hatfield Broad Oak (population 1,600) and Hatfield Heath (population 1,500). Stansted is currently the UK's fourth biggest passenger airport, with 18 million passengers in 2011, and one of the UK's major airfreight hubs,⁴⁷ with dedicated cargo services to the Far East, Africa and North America performed by companies including FedEx, UPS and British Airways World Cargo. The 3,048-metre-long single runway, single terminal airport is owned by BAA and is currently served by 14 passenger airlines which connect Stansted to 125 destinations in Europe. The airport is currently a base for Europe's two largest low-cost operators, easyJet and Ryanair, which took advantage of the liberalisation of the European aviation market during the 1990s to establish new routes and compete on price with incumbent airlines by offering only what was necessary for safe and reliable air transport. Both airlines expanded quickly and, during the late 1990s and early 2000s, facilitated rapid

levels of year-on-year passenger growth. In 2011, Stansted handled over 140,000 air transport movements.⁴⁸ All outbound flights depart on six predefined noise preferential routes (NPRs), three from each end of the runway. These routes were established in 1989 following extensive consultation with the UK Government and were designed to prevent aircraft overflying of built-up areas where possible. The NPRs lead from the take-off runway towards the main en-route airways, and form the first part of the Standard Instrument Departure routes (SIDs) which define how aircraft join en-route airways. Each NPR is given a name based on the runway heading and navigation beacon or waypoint it serves. The six NPRs at Stansted are: 22 Buzad, 22 Clacton and 22 Dover (for departures using runway 22) and 04 Buzad, 04 Clacton and 04 Dover (for departures

using runway 04). Crucially, these NPRs are not a single route, but a three-dimensional swathe of sky which is designed to provide acceptable tolerances to aircraft operators flying the route to take account of the performance of individual aircraft and flight management systems, adverse weather and other safety-related factors (see Figure 1).

While the NPR regime works from an operational and regulatory perspective, it is arguably less successful from a community perspective. This, in part, is due to the fact that many local residents are not familiar with the nature, extent or operation of the NPRs and do not appreciate that individual aircraft tracks can vary (seemingly randomly) within them. As a result, complainants commonly (if erroneously) believe that aircraft are 'straying off course' and/or flying too low or too close to their homes and communities.

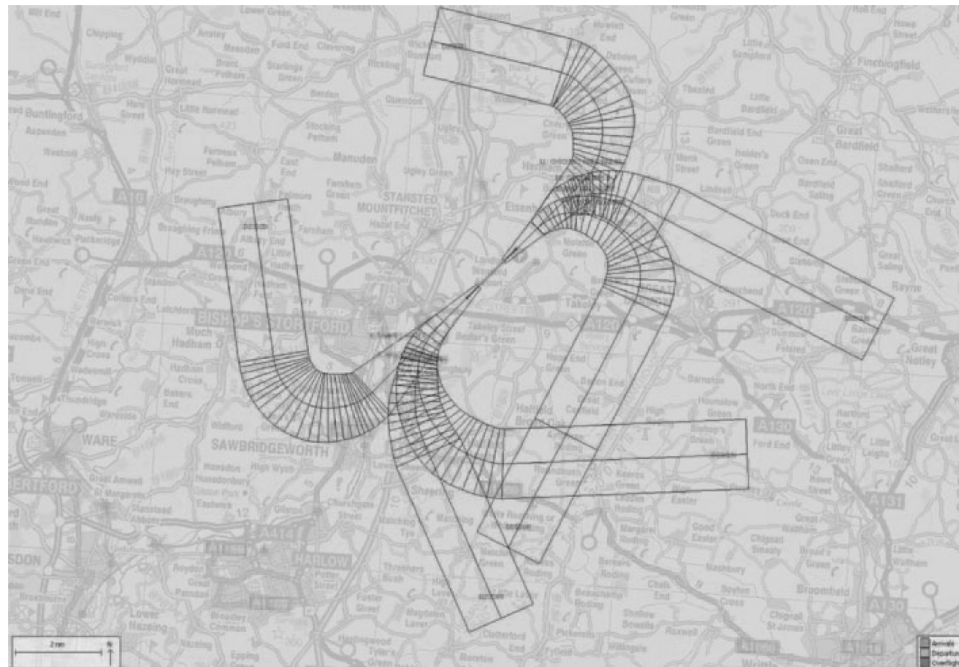


Figure 1 The six noise preferential routes (NPRs) at Stansted showing centreline and tolerance zones; clockwise from top: 04 Buzad, 04 Clacton, 04 Dover, 22 Clacton, 22 Dover and 22 Buzad

Source: London Stansted Airport Noise and Track Keeping System. Reproduced by permission from Ordnance Survey on behalf of HMSO. © Crown Copyright. All rights reserved.

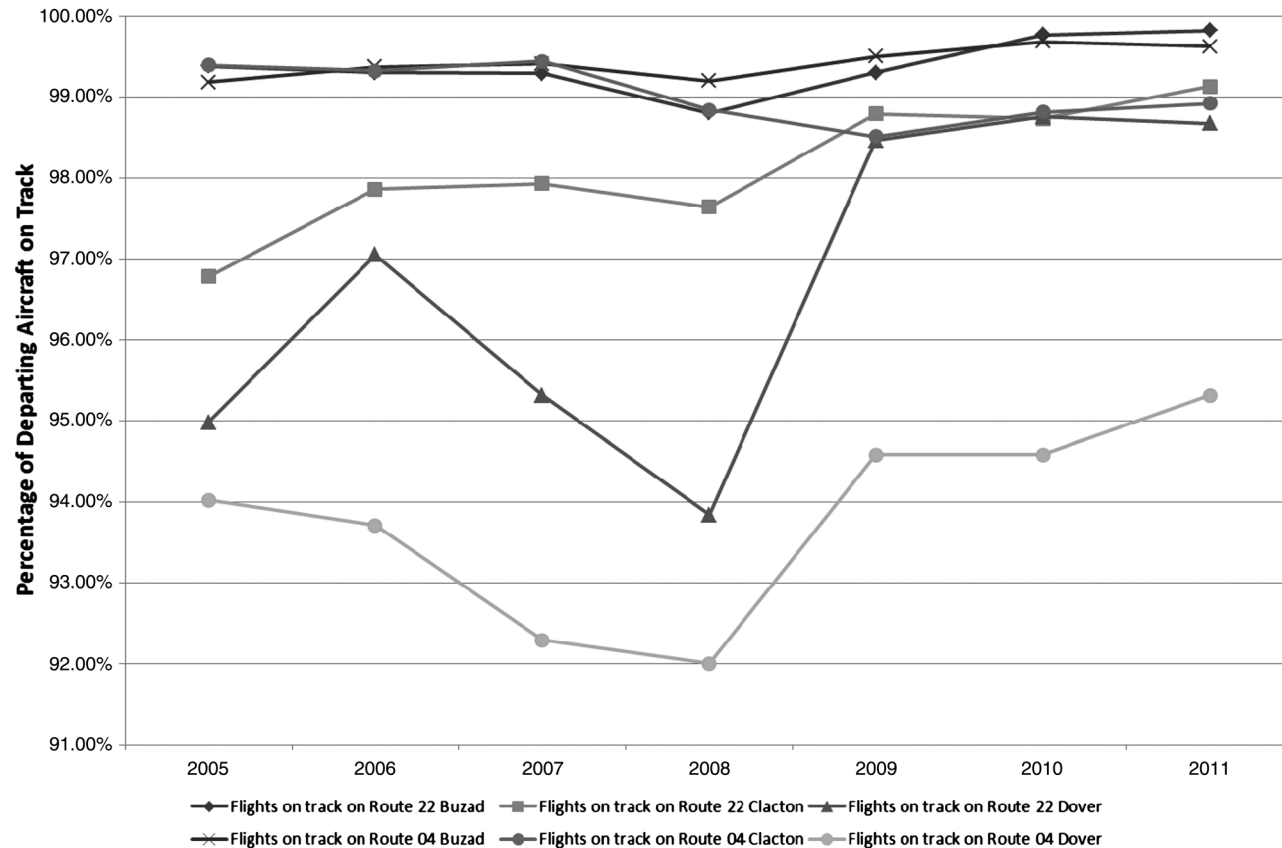


Figure 2 Track-keeping compliance at Stansted, 2005–10

This situation arguably is exacerbated by the use of the term *flightpath* to describe aircraft tracks. In popular parlance, a path describes a clearly defined track along which something travels. Local experiences of aircraft flying within the broad swathe of the NPRs are thus incompatible with this perspective. To reduce the acoustic impact of aircraft operations on local communities, Stansted worked with the UK's Air Navigation Service Provider, NATS, and airline partners to improve track-keeping performance. This initiative resulted in compliance rates on all departure routes improving, often significantly, between 2005 and 2011 (see Figure 2).

The 22 Clacton and 04 Dover NPRs, which handle aircraft destined for Benelux, Scandinavia, Germany, Italy and

other destinations to the east and south-east of Stansted, are the subject of intense efforts to improve track-keeping performance and a study is currently being undertaken to assess the feasibility of using precision satellite navigation (P-RNAV) to further improve compliance rates.

Stansted also works actively with airlines to improve track-keeping performance. In 2008, joint collaboration between the Greek carrier, Aegean Airlines, and the airport indicated that the introduction of P-RNAV waypoints along the NPR centreline could help to improve track compliance on the 22 Dover route. Prior to the introduction of the P-RNAV waypoints, 55 per cent of Aegean's departures flew outside the NPR, meaning that the noise from their aircraft was dispersed over

a much wider area than that of other operations, thereby causing annoyance to a greater number of residents. The introduction of waypoints along the NPR centreline enabled Aegean Airlines' pilots to fly much more precise departure routes. By December 2008, all Aegean departures were operating within the NPR and concentrated along the centreline.

Following the trial, Stansted sought to have the waypoint information formally published in the UK Aeronautical Information Publication (AIP, which stipulates the operating procedures at individual airports) so that it would be available to all airlines; however, the waypoint information did not comply with international ICAO-mandated RNAV design criteria and so the UK's CAA was unable to formally publish the information.⁴⁹ Despite this setback, the airport continued to work with the airlines and also the local communities around the airport to both investigate and then demonstrate the benefits of P-RNAV routings. In 2008, the Malaysian low-cost long-haul operator, Air Asia X, began flying from Stansted to Kuala Lumpur using A340-300 aircraft. These airframes are significantly larger and generally noisier than the A319 and B737-800 aircraft that are operated by easyJet and Ryanair, respectively, and the departures predominantly followed the 22 Clacton NPR. This route took the aircraft close to the villages of Hatfield Heath and Hatfield Broad Oak. Due to time zone differences between the UK and Malaysia, the aircraft were scheduled to depart from Stansted between 2300 and 0000 hrs local time. This change to the noise patterns experienced by the local residents under the departure route led to a significant increase in complaints to the airport and resulted in a meeting being arranged in Hatfield Heath in September 2009 which involved the local MP. At this meeting, the airport, working with community repre-

sentatives through the noise and track-keeping working group, proposed a series of steps it would take to try and find ways of reducing the noise nuisance for the affected communities. One of these steps was to set up a P-RNAV trial on the 22 Clacton NPR to see if aircraft could be directed between (rather than over) the two villages (see Figure 3). Initial trials of the P-RNAV departure by airlines, including Air Asia X, proved the route could be flown reliably (see Figures 4 and 5).

The next stage of the trial was to get the waypoint information formally published for all airlines to use. Again, problems regarding ICAO RNAV design criteria were experienced; however, positive feedback from both airlines and the local communities was so strong that it was decided both the airport and a local community representative would take the case to the CAA. In November 2011, the CAA agreed to explore the possibility of a formal trial based on a Radius-to-Fix (R-T-F) design on the 22 Clacton and 04 Dover NPRs. At the time of writing (August 2012), a number of flight safety assessments are being undertaken on flight simulators. If these are successful, it is hoped a formal trial will start in autumn 2012 with a view to having the new information published in the UK AIP.

DISCUSSION — TOWARDS COLLABORATIVE DIALOGUE

The above case studies highlight the importance of engaging not only airline partners, air traffic control providers and local communities in collaborative dialogue but also the national aviation regulator. There are several important reasons for focusing on what, at first, appears to be very local, site-specific issues. At East Midlands, the airport effectively engaged with the CAA and obtained its approval

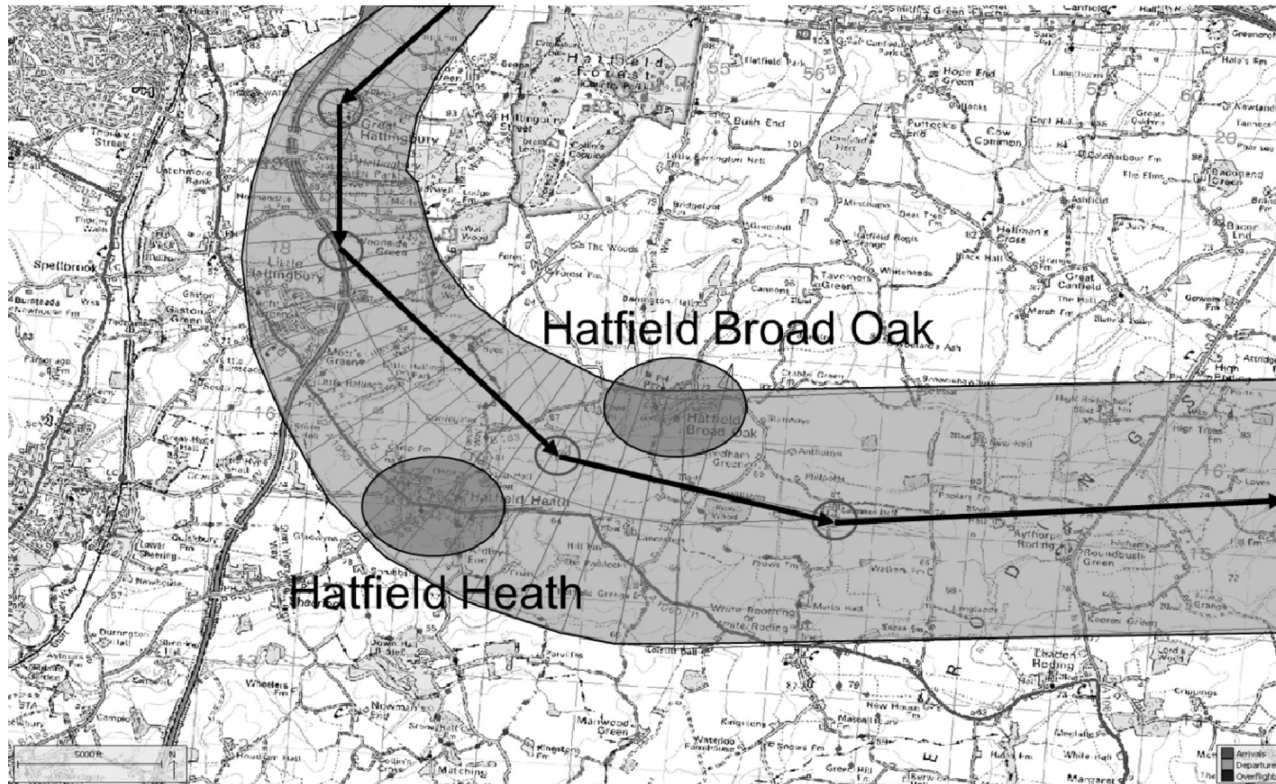


Figure 3 P-RNAV trial on the 22 Clacton noise preferential route (NPR); circles indicate the new waypoints, the grey swathe the extent of the existing NPR
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although many local residents felt that the airspace change was being imposed on them without any real form of consultation or redress. In contrast, at Stansted, procedures that had been devised in consultation with the local community to deliver tangible reductions in noise exposure could not be implemented because they did not comply with existing legislation. Clearly there is a need for airports to learn from one another and share best practice; however, the combined absence of a formal national framework for facilitating this data sharing and a lack of empirical research in the area of airport stakeholder engagement and community perceptions of aircraft noise make the identification and formulation of best

practice guidance inherently challenging. One possible way forward is for airports and academics to work together to examine social perceptions of aircraft noise and establish the acceptable trade-offs and social priorities between noise reductions, increased emissions and operational feasibility. Such an approach would need to be coupled with a more robust framework for identifying key stakeholders, understanding their perspectives, appreciating which (if any) solutions would be acceptable to them and engaging in collaborative dialogue before embarking on any project. While reflexive and collaborative dialogue has been practised to a limited extent at selected airports,⁵⁰ this approach needs to be refined and accepted as



Figure 4 Track of Air Asia X flights before the P-RNAV trial (December 2009)

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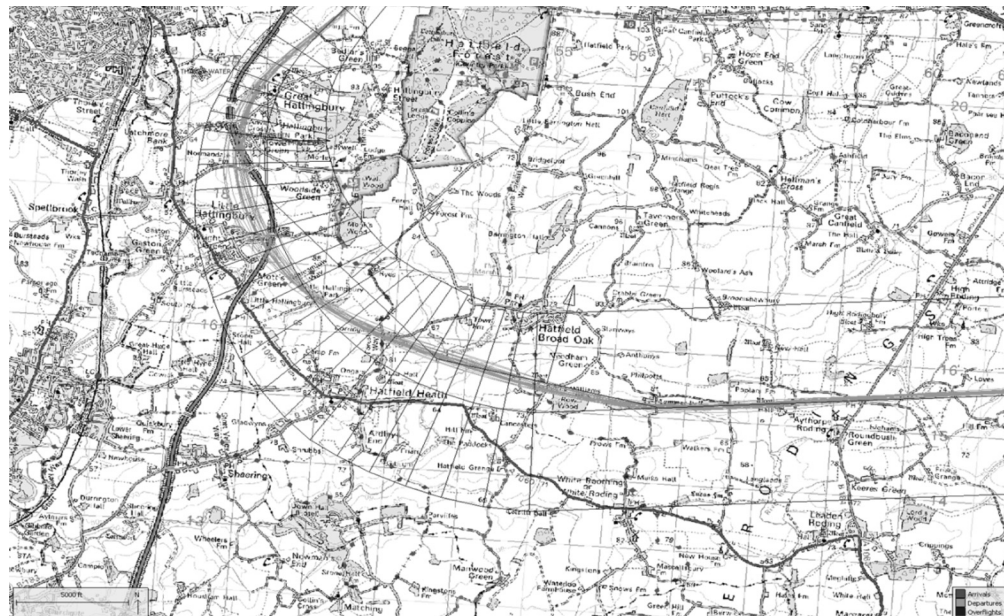


Figure 5 Track of Air Asia X flights following the introduction of P-RNAV waypoints (July 2010)

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common practice. Clearly this approach would also align with the spirit of 'working together' explored by the UK Government in chapter 5 of its 'Draft Aviation Policy Framework' document.⁵¹

CONCLUSION AND RECOMMENDATIONS

The two case studies of flightpath change presented here highlight an urgent need for the aviation industry and academia to develop more holistic understanding of social perceptions of aircraft noise and air transport operations on a variety of scales. Both case studies demonstrate the importance of engaging all stakeholders who are involved in, or affected by, aircraft noise and changes to flightpaths (including, but not limited to, airport operators, airlines, community groups, pilots, air traffic controllers, aviation regulators and local authorities) in systematic, effective and collaborative dialogue and joint working. This approach would help to overcome the lack of trust between groups and the local community annoyance and opposition resulting from local residents' perceived inability to influence policy which affects their immediate environment and quality of life.⁵²

Lack of communication and consultation about planned changes to airspace use at East Midlands airport led to a major community and public relations challenge which delayed the implementation of the proposal and led to considerable bad feeling among certain sections of the local community.⁵³ At Stansted, meanwhile, a deliberate policy of engaging the community early on in the waypoint trial was considered instrumental in its success; however, failure to appreciate the CAA's position with regards to international regulations meant that the environmental and acoustic benefits of the scheme could

not be fully utilised. Both case studies emphasise the importance of understanding community reactions to, and social perceptions of, aircraft noise. Although geographically separate, both sites share some common features. Both airports are located in predominately rural areas where ambient noise levels are relatively low and both have recently undertaken programmes of airspace change or flightpath reconfiguration. Both airports have had to engage with residents who resent the acoustic burden the airports impose and both sites have had to communicate complex spatial and technical information to non-specialists in ways that were comprehensive yet comprehensible.

The complex global interconnected nature of modern air travel means that procedural changes at one site will affect surrounding airports and airspace sectors as well as communities on the ground. In the past, 'not in my back yard' reactions against aircraft noise served to move the problem elsewhere but such an approach is no longer feasible or desirable. It is critically important that airport operators engage all stakeholders who potentially may be affected by any form of development proposal from the outset and put in place the human and material resources that will facilitate productive collaborative dialogue between the airport operator and local communities. Adopting such an approach will help to avoid some of the strained interactions that have characterised airport-community relations in the past. Further research in the field of social perceptions and best practice community engagement will be vital to ensuring that information about future development projects is disseminated in a comprehensive yet comprehensible way which invites feedback and actively embraces (rather than avoids) collaborative working.

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