Luton Runway 26 RNAV PIR submission on behalf of LADACAN

This submission is made by LADACAN (the Luton And District Association for the Control of Aircraft Noise), a long-standing residents’ group which represents the views of people in communities all around Luton Airport affected by noise from its flights. The report draws on first-hand experience, public residents’ meetings, and email feedback from large numbers of people over the period since RNAV was first introduced in August 2015. LADACAN is well versed in the Airport’s noise and track monitoring process, and regularly attends the LLACC Consultative Committee and its Noise and Track Subcommittee, NTSC, for which is has produced a number of informational reports and analyses.

1) PIR process
We base our expectations of the PIR process on the CAA’s online guidance to be found at: https://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Reviews/Airspace-changes-post-implementation-reviews/

In particular we note:

“Post implementation reviews provide a rigorous assessment by us, as the independent regulator, of whether the anticipated impacts and benefits, set out in the original airspace change proposal and decision, have been delivered and if not to ascertain why and to determine the most appropriate course of action”

We summarise in section 2 the declared anticipated impacts and benefits in noise terms of the RNAV airspace change, which will no doubt be among the criteria which the CAA takes into account during its review. Our assessment of the extent to which the RNV implementation has delivered against the criteria is provided in comments in red beneath each one in the subsections below.

2) Comments on anticipated impacts and benefits
We take the “Airspace Change Proposal Environmental Assessment ref SARG/ERCD/AG/Luton R26 RNAV SID ACP”, 9 Mar 2015 (“EnvAssess”), as representative of “the original RNAV airspace change proposal and decision” and its anticipated impacts and benefits in noise terms are summarised here:

2.1 Section 3.1 of EnvAsses states:

“The rationale for the change is primarily to improve track-keeping and therefore avoid the (sic) overflying densely populated areas as far as possible. Minimising the overflight of densely populated areas should result in a reduction in the number of people affected by aircraft noise, but equally the concentration of traffic that should result from flying an RNAV SID may also result in some people being overflown more frequently and therefore experiencing an increase in noise.”

It is clear from track plots provided by the sponsor (See ConDoc) that the RNAV implementation reduced the direct overflight of the densely populated areas of Hemel Hempstead, Harpenden and St Albans. Whether this resulted in a reduction in the number of people affected by aircraft noise is less easy to show, since as the criteria in 2.3 make clear, there is no clear definition of “overflown”, and even if someone is not directly overflown they will still be affected by aircraft noise.
It is also not clear what “affected by noise” was intended to mean. The complaints data indicates that substantially more people have complained about aircraft noise. A noise model of the narrow corridor between Harpenden and St Albans shows that for people living on the fringes of closely spaced communities where the swathe had extended across the gap and into each community, concentration down the centre can make everyone aware of all flights because they will all sound similarly loud. Some (the occasional direct overflights) previously sounded louder whereas others (nearer the distant community on the other side of the gap) were quiet enough not to be noticed. Although direct overflight is avoided, concentration close to a community can increase the number of flights exceeding a noise annoyance threshold and worsen the annoyance caused. An often-used measure is the number of flights exceeding a noise annoyance value: this was ignored in presenting the anticipated benefits. Over-close proximity exists all along the route, and creates visual intrusion.

The claim that some people would be directly overflown and experience an increase in noise has been found to be only too true for residents of Childwickbury, Redbournbury and Sandridge.

2.2 In section 4.1 of EnvAssess it states:

“There is therefore an expectation ... that traffic will be concentrated at least as far as St Albans”

“Following a period of familiarisation, the swathe width would be reduced from 3km to 2km for the aircraft flying the new RNAV1 SIDs. The familiarisation period will be a maximum of 6 months.”

“Typically aircraft will be at least at 6000ft as they reach the railway” [a north/south line which runs though Harpenden and St Albans]

“The proposed RNAV1 route design is not anticipated to alter or affect the rate at which the aircraft climb” and “The gate penetration diagrams ... support this expectation that vertical profiles will be no different.”

Track plots show that the RNAV technology is capable of delivering reduced spread, though its ability to do this consistently in the same place from day to day is less impressive: the swathe “wobbles” in response to the wind from day to day, and can bow outwards (between Flamstead and Markyate) and then inwards (south of Redbourn) on a given day as the FMS systems respond to wind effects.

The effect of tactical vectoring spreads the swathe, and information from the sponsor is that some 25% of flights (our own measurement suggests 35% ) start to deviate from the route heading before the railway line, even if they may still remain technically within the NPR while they diverge from the centre line. This is relevant to 2.9 below.

Figure 1 overleaf shows a combined track plot produced by the sponsor for departures between Jul 17th-24th 2017, indicating the remaining extent of inconsistency in the second turn. The criteria do not make clear whether comments about swathe width and concentration are intended to mean “the swathe will have a similar width day to day but its position may move by a factor of four times its width from the centre line depending on the weather” or not – that is for the CAA to decide.

A commitment to “typically” reaching 6000ft by the railway line might be taken to imply say 70% of aircraft will reach 6000ft by that point: in fact recent indications are that less than 40% of flights which broadly remain on the centre line reach 6000ft or more by the railway line.

Recent analysis by LADACAN which was confirmed by the sponsor shows that the vertical profile of flights has changed coincident with adoption of RNAV, resulting in an average reduction of altitude by south of Redbourn of some 200-400ft depending on type, as shown in Figure 2 produced by the sponsor. The step-down in altitude is coincident with the successful RNAV adoption per category.
Figure 1: Runway 26 Match/Detling RNAV departures between 17th-24th July 2017

Figure 2: Timeline of average altitude per month by category for R26 RNAV departures measured at an altitude gate positioned south of Redbourn, just after the second turn and after crossing the M1.
2.3 In section 5.1 of EnvAssess it states:

“The sponsor explains that for both of the trial options, an expected benefit will be that they ‘reduce
the number of people directly overflown, thereby minimising noise impacts’. It should be noted that
being overflown is not an exact measure of who will experience noise impacts. Depending on how
‘overflown’ is defined and measured, the noise impact may in fact extend to residents that are not
defined as ‘overflown’”.

It goes on to say:

“It is important to bear in mind that a boundary that defines a population ‘overflown’ will not
necessarily represent the boundary for any noise impact. An aircraft that flies within such a swathe
may still cause noise on the ground beyond the swathe boundary.”

Other relevant comments are made in the SARG discussion of the proposal in terms of noise impact
highlight the inappropriateness of equating this with “being overflown”, the lack of any accepted
definition of “overflown”, and the use of an inappropriately small swathe for population counts.

Since the consultation and implementation of RNAV at Luton the CAA has clarified in CAP 1498 what
is meant by “overflown” and the noise implications of living close to, albeit not directly beneath, a
swathe. It is for the CAA to assess whether the distance between the more concentrated tracks of
R26 RNAV – given that the location of those tracks varies from day to day and spreads as per Figure
1 over a period of 7 days – suggests that those on the fringes of Markyate, Flamstead, Redbourn,
Hemel Hempstead, Harpenden and St Albans are still “overflown” in terms of their noise experience.

2.4 In 9.1 of EnvAssess a reference is made to Visual Intrusion having been adequately considered.

As mentioned in 2.1 above, aircraft spread over a wide swathe are likely to cause less audible
perception of flights due to the wide range in individual loudness for someone under the edge of the
swathe, than if the swathe is very concentrated. In the same way, visual intrusion may be perceived
as less when the aircraft are spread and hence some very distant, compared to when they all
apparat to be in roughly the same position from flight to flight. In this sense perhaps Visual Intrusion
was not adequately considered.

2.5 In 13.1 of EnvAssess it is stated that traffic forecasts were provided and appear reasonable.

ConDoc also provides traffic forecasts which would be expected to tally with those mentioned in
EnvAssess section 13.1 comments regarding forecasts. Note that this is described by the sponsor
(the airport operator) as an upper-end movements forecast, published in April 2014. See Figure 3.

Using the disclosed forecasts, traffic growth on the R26 RNAV BPK route was expected (by the CAA
and the consultees) to be 9.6% between 2013 and 2016, for example – an increase from 62 to 68
flights per day. In actual fact, the Annual Monitoring reports show an increase of flights on that
route of 66% - more than six times what was disclosed in the traffic forecasts.

It is for the CAA to assess whether the route was operated in the manner described by the sponsor
in the airspace change request, or whether the sponsor exceeded its permission under the airspace
change given that:

- traffic levels could have been managed to stay in line with the parameters declared for the
  airspace change by not permitting departure slots to be used at a rate exceeding the rate
  declared in the application
• this was the first introduction of RNAV at Luton and the experience on the ground was an unknown quantity, and so it would have been prudent to stay within parameters
• it was clear early on that the Boeing aircraft types had difficulty in engaging with RNAV on the first turn, and consequently that the PIR was going to be delayed and that therefore the chance to respond to the escalating numbers of complaints would also be delayed
• the CAA had already expressed reservations in particular about the direct overflying of Sandridge

Table 2. Air traffic movements – Totals and BPK departures

<table>
<thead>
<tr>
<th>Year</th>
<th>Million passengers per annum</th>
<th>Total Air Traffic Movements (ATMs) per annum – 000s</th>
<th>Runway 26 Departures per annum (in use for 70% of the time) – 000s</th>
<th>Runway 26 Departures on BPK route per annum (40% of R26 departures) – 000s</th>
<th>Average number of departures on BPK route per day when in use</th>
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N.B. 2010-2013 are based on actual movement data, whereas 2014-2030 is a forecast based on upper end, unconstrained demand, assuming the development proceeds as planned (based on London Luton Airport Operations Limited Revised Masterplan document [http://www.london-luton.co.uk/en/about/].

Figure 3: Upper end traffic forecasts for flights at Luton as declared in the RNAV ConDoc

In our view, the change sponsor acted irresponsibly in not throttling the rate of increase in air traffic given the commitment it had made when securing permission to implement RNAV in the first place. This lack of responsibility – or perhaps lack of respect for process and for the people living in the affected communities – meant that rather than one change, people endured two significant changes at once: concentration of noise and tracks with consequent change in flight patterns and intrusion, coupled with a very rapid increase in numbers of flights. A third, creeping change also occurred at the same time: the shift in the fleet mix towards larger, heavier and noisier aircraft to accommodate the rapidly burgeoning numbers of passengers. And, as indicated in 2.2 above, the average altitude of the flights declined coincident with RNAV introduction.

Flindell and others (with whose work we trust the CAA is familiar) have observed that people who are affected by aircraft noise tend to be sensitive to when something changes, particularly if they have lived in an area for some time.
It is hardly surprising that complaints have escalated by ten-fold in some areas. Although complaints numbers do not necessarily provide a scientific measure of annoyance due to lag caused by people first wondering what is happening, then trying to find out, then working out what they might do about it, then finding out how to complain, then not seeing any improvement so complaining more, it is clear that a significant upward trajectory in complaints statistics indicates something is wrong. And a corresponding upward trajectory in placatory newsletters and PR from the business receiving the complaints often indicates that it realises something is wrong but cannot see how to put it right, or does not wish to. It is not an overstatement to say that the whole area affected by this route has now become sensitised to aircraft noise, thanks to two significant changes imposed when only one was expected. The CAA needs to consider whether this constitutes careful stewardship of airspace.

2.6 Under 14.2 of EnvAssess the specific problem of Sandridge is mentioned, a query raised about why the village could not have been bypassed, and a note that air traffic at 6000ft will be perceivable and that monitoring alone does not solve the problem – in fact that it was unclear what the next course of action would be. There is discussion of the effects of vectoring, an unquantified assertion that aircraft would be dispersed before arriving at Sandridge, and a note to revisit this during the PIR.

The CAA will no doubt enquire of the sponsor the percentage of the aircraft still on the centre line by the time they reach Sandridge, the mean and modal altitudes over the village, and the measured noise levels before and after RNAV introduction. It is clear from the SARG review that even in early 2015 the overflight of Sandridge was considered undesirable, but more than 2 years on it remains an issue.

2.7 Also in 14.2 it is noted that there was a disconnect between the NPR and the swathe.

We observed significant confusion in the minds of residents during RNAV consultation because of what has become known as “the RNAV paradox”: the centre line moved south in the vicinity of Harpenden and Redbourn, but the swathe of aircraft moved north. People in South Harpenden were taken by surprise to find aircraft flying so much closer to their community.

2.8 Section 16.1 notes the effect of ATC on traffic concentration and the importance of needing to guarantee that concentration will continue to be achieved for traffic instructed to stay on the SID.

It is clear from Figure 1 above that tactical vectoring by ATC has a significant effect on the impact of this RNAV route, and aircraft which are vectored are not always given climb clearance so there is a fanning out of low-flying aircraft. In terms of reducing concentration of noise, this may not always be a bad thing, but it makes the point that when consulting on a route, it is imperative to take account in more detail of the likely effects of ATC vectoring, so that the consultation process is transparent. In this instance that does not seem to have happened.

2.9 Section 17.1 highlights particular considerations for the PIR:

- Ensuring tactical vectoring does not occur until the railway line
- Monitoring noise levels in South Luton compared to pre-implementation
- An update on progress with the [off-track] penalty system
- A report on noise monitoring in Sandridge and progress on a redesigned SID in that location

The CAA will no doubt ensure that adequate progress has been made in all these areas during its PIR.

2.10 Section 19.1 reviews whether overall environmental benefit can be demonstrated and notes that the RNAV options will:
- be likely to result in fewer people being affected by aircraft noise
- be likely to concentrate traffic along the SID
- have no expected negative impacts for ... visual intrusion

We also refer to statements made by the Change Sponsor in its public briefing and consultation documents.

In “Airspace Change Proposal: RNAV1 Procedures on the Runway 26 Brookmans Park Departure Routes, Stakeholder Consultation”, April 2014, (“ConDoC”) the sponsor states in the foreword, with our highlights:

“We recognise at the local level, the main issue is noise disturbance. In order to preserve the balance between a vibrant, growing airport and the need to protect our local communities from excessive aircraft noise, we have developed a robust set of measures which form the Airport’s Government approved 55 point Noise Action Plan. As part of our commitment to our neighbours we continually look for ways in which we can reduce the impact of the Airport. The recent introduction of GPS based aircraft navigation technology known as Area Navigation (RNAV1) is a unique opportunity to do just this. Through enabling flight routes to be flown consistently more accurately, and by giving greater flexibility in their design, we are able to route flight tracks to avoid centres of population wherever possible, thereby potentially reducing the number of people disturbed by aircraft noise and through more efficient routeing of aircraft, reduce airborne emissions.”

The criteria and consultation aspirations go to the heart of what the community was led to believe would be the outcome of RNAV implementation. People living around the airport and disturbed by noise are not so much concerned with technicalities of navigation technology, as by their day-to-day and night-to-night experience of the annoyance, stress and frustration caused by aircraft noise which they have absolutely no means of controlling short of staying indoors all day long with triple-gazed windows firmly shut in a room swathed with insulation material. It is unreasonable to expect that.

Glyn Jones, in his foreword to the RNAV ConDoc said “we continually look for ways in which we can reduce the impact of the Airport... RNAV1 is a unique opportunity to do just that”. Was he right?

There is a key learning experience from this exercise: concentrating noise at low altitude close to communities is not a clever way to reduce impact – in this case for all the reasons cited above it has increased impact. LADACAN has requested many times that the sponsor conduct rigorous noise monitoring at five points at least simultaneously along and across the RNAV swathe between south Harpenden and north St Albans in order to gather detailed information on what that impact actually is: the sponsor has declined. We call on the CAA to insist that this is done before any further RNAV routes are implemented, so that any future route proposals which may be modelled can be checked with a calibration exercise against a detailed noise profile of this route.

A second key learning experience is that changing two significant impactors on the level of aircraft noise (concentration and the number of movements) at the same time when the route passes so close to communities is unwise. We call on the CAA to ensure in its airspace review processes that simultaneous changes of the magnitude experienced here are far more carefully examined. If an operator is given leave to concentrate an established route in such a way that nearby communities are still “overflown” in CAP 1498 terms then further expansion of capacity on that route should be put on hold until after a successful PIR.
A third key learning experience is that the designers, the operators and the airlines all overlooked the effect of the change in track miles and the reduction in speed on the average altitude. Reduced track miles on the RNAV route taken together with the reduced speed should still have given the aircraft a similar time to climb to altitude. LADACAN has established that the RNAV speed reduction appears to have been coded into the FMS systems in such a way as to affect departure speed on the non-RNAV Runway 08 operations as well, yet these have not suffered a decline in altitude, which implies that overall throttle settings have been reduced. Whilst an average 200-400ft reduction in altitude at around 4900ft ASL or 4500ft above terrain might not appear to cause a significant noise increase, it should be remembered that this is an average and hence many will be lower than this. The actual impact is not known because of insufficiently detailed noise monitoring, but it could be discovered by the noise profiling requested by LADACAN, to enable the relationship between noise and altitude in the specific context of this route to be established.

3) LADACAN conclusions

In conclusion, our observation is that the sponsor has failed to keep faith with the community in the way this airspace change was delivered. Consulting on the basis of reduced noise, even though it was clear that the concentrated tracks passed so close to communities, suggests a lack of understanding which hopefully CAP 1498 has now illuminated. Even then, “reduced noise” is a vague and undefined term. Future consultations need to be more carefully researched and more transparently presented.

Permitting two significant impactful changes at once is clear evidence that the sponsor put its own business priorities (and hence those of its owner, Luton Borough Council) above its responsibility to honour the moral contract with the community so clearly established in the 2013 expansion DevCon meeting: that in return for and in step with capacity expansion, there would be effective mitigation in the form of quieter aircraft and stricter noise controls. Neither has been delivered, and yet 50% passenger capacity expansion has been permitted to occur in just 4 years rather than the 9-10 years originally declared in Figure 3. This is a failure of proper regulation of the use of airspace as much as anything, and the CAA is the regulator.

It also demonstrates that an airport which professes to want to be a good neighbour by going to all the expense of an RNAV airspace change consultation (which it had to do anyway to accord with the European directives for PBN) permitted a 66% increase in flights on this route in three years at the same time as flight concentration, without any capability to mitigate by a corresponding amount. The sponsor only has itself to blame for the firestorm of complaints which has erupted.

From the perspective of PIR, our view is – as we have explained in public at a scrutiny meeting in St Albans – that technically RNAV broadly appears to have worked except for two problems. Firstly, the sponsor acknowledges that an RNP overlay is required to fix an unexpected sensitivity to wind, as mentioned above. Secondly, the design exposed serious technical issues in relation to Boeing aircraft at the first waypoint which took 18 months to fix. We observe that from time to time departures still sometimes appear to fail to engage with the RNAV route and follow the original ballooning path: we invite the CAA to request and inspect track plots from the sponsor which identify off-track aircraft that have strayed too far to the south at Redbourn.

The route design however has clear environmental deficiencies. It was queried in the SARG review for its direct tracking across Sandridge. Flights can also remain low (4000ft) sometimes even as far as Welwyn and beyond, and a recent initiative to achieve better synchronisation with LHR departures
to provide an opportunity for R26 Match/Detling flights to climb directly to 5000ft is even now still not ready to deliver – 2 years after RNAV was introduced.

The pattern of flights overall is distorted by the effects of ATC vectoring, which suggests that vectoring and route design must be considered hand-in-hand in future. The environmental impact is hard to determine precisely due to lack of detailed noise monitoring to establish a simultaneous profile along and across the route, and due to two major changes being permitted at the same time.

Local stakeholders are currently involved, as the CAA will know, in a new airspace change process to solve the environmental fallout from this implementation. We are advised it will take at least 2-3 years to deliver, and depends for delivery of increased altitude on collaborative redesign of the local airspace between the major London airports. The timeframe is likely to be optimistic unless the CAA makes special provision – which we call upon the CAA to facilitate in return for its part in permitting the R26 RNAV route to be implemented and operated in the context of steep capacity increase and given all the issues raised above.

Andrew Lambourne
Chair, LADACAN Executive Committee
30 September 2017

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