



London Luton Airport
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Luton
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24th April 2019

Dear [REDACTED],

I am writing in response to the Civil Aviation Authority's (CAA) request to provide our assessment of the implementation of the RNAV procedure MATCH2Y as part of the PIR requirements.

In 2014 the Airport submitted a proposal to introduce an aRea Navigation (RNAV) procedure on the departure route from runway 26 that routed via Bookman's Park (BPK) as aircraft that were using the standard instrument departures (SID) to Clacton (now Match) and Detling often flew outside the Noise Preferential route (NPR), overflying densely populated areas such as Hemel Hempstead and St Albans. Figures 1.1 and 1.2 on pages 4 and 5 of the formal submission document illustrate this.

The introduction of the RNAV procedure was to enable a route to be designed within RNAV1 tolerances that avoided centre of populations. The objective of the proposal was to implement new RNAV SID's along the Runway 26 departure route towards Match and Detling for which the nominal route tracks between Markyate and Flamstead, Redbourn and Hemel Hempstead, as well as St. Albans and Harpenden but still remains within the current NPR corridor.

Following trials and consultation the option formally submitted was the proposed RNAV1 SID with an initial speed restriction of 220 knots.

Following implementation in August 2015 the Airport identified an issue with the procedure whereby some Boeing aircraft flying the RNAV SIDs had issues with the database coding and how their aircraft Flight Management Systems (FMS) were interpreting how the procedure should be flown, this resulted on occasions some Boeing aircraft flying further to the west and south on the turn towards Bookman's Park. We therefore suspended the use of the SID by Boeing aircraft in December 2015.

We resolved the issue and implemented a revised design in February 2017 and can say that we have had no further issues since implementation of the revised design.

Track Compliance

Track compliance is monitored daily, reported internally weekly and in the public domain quarterly. Given that the technical tolerances are +/- 1nm, majority of aircraft tracks are routinely within a 500m swathe without tactical intervention and compliance with the procedure is regularly above 99% except for occurrences of weather avoidance and strong winds. In 2018 track compliance was 97% this calculation includes instances of weather avoidance and track violation.

As expected there is some dispersal in the turn dependent on a number of factors;

- Aircraft type
- Aircraft size
- Weather
- Speed

As you will have seen from the track plots submitted as part of the data requirements for the PIR there is some dispersal in the second turn (GW06) the main reasons seen for dispersal for the same aircraft type are down to wind direction and speeds.

Effects of Speed in the Turn

There is a maximum speed restriction in the turn of 220KIAS and through investigation it has been found that the speed at which the aircraft passes through the turn has an impact on its lateral position, i.e. the faster the aircraft approaches the turn the earlier the turn initiation and therefore the aircrafts lateral position tends to be on the inside of the turn, whereas if the aircraft is slower approaching the turn then the turn initiation is later and therefore the aircrafts lateral position tends to be on the outside.

A good example of this is the differing lateral positions in the turn of the B738 track plots and the B752 plots, as the B738 is lighter it reaches higher speeds earlier and therefore initiates the turn earlier, eg B738 ground speed of 240kts inside the turn vs B752 ground speed of 212kts outside the turn. There is also variation in lateral position dependent on aircraft manufacturer and database providers however lateral positions are always within RNAV1 technical tolerances.

It cannot be expected that every aircraft will follow the nominal centre line through a turn of an RNAV procedure, in order to achieve this a radius to fix turn would be required.

As there are currently no set standards for database providers and coding houses to ensure consistency of procedures programmed within an FMS there will always been some slight nuances in the way that aircraft may interpret departure procedures.

Noise

The table below shows noise results from pre-implementation ⁽¹⁾ and the results of the noise measurements taken in 2017.

Locality	Average Measured Airbus A320 Departure Noise Level dB L _{Amax}	
	Pre-implementation	2017 noise monitoring results
1. South Luton	78.5	78.4
2. Slip End	72.6	74.2
3. Flamstead	68.1	65.0
4. Redbourn	(64.2)	63.0
5. Hemel Hempstead	67.2	64.0
6. St Albans	63.9	63.8

(1) Page 5 Appendix 2.2 Noise Assessment of the 2014 Formal Submission

ATC Vectoring

As part of the formal submission it was proposed that as well as increasing the NPR release altitudes an additional restriction to vectoring practices would be implemented to ensure that aircraft would generally track within the swathe until crossing the railway line between St Albans and Harpenden, notwithstanding the fact that ATC would retain flexibility to tactically vector aircraft for operational or safety reasons, below are the extracts from LTCC MATS pt II.

5.2.1 Noise Preferential Routes

In order to alleviate noise pollution in the vicinity of Luton Airport, the minimum altitude at which departures can be vectored off NPRs is 3000ft except:

- 4000ft for all RNAV1 departures,
- 4000ft for conventional departures from Runway 26 via CPT, OLNEY, MATCH or DET,
- 4000ft for all departures between 2300 and 0700 local.

5.2.1.1 Runway 26 CLN and DET Departure Vectoring Restriction

In addition to NPR restrictions as detailed in NTH 5.2.1, the following restrictions also apply to all Luton MATCH and DET departures from Runway 26:

- Night Time - During the hours of 2300 and 0700 local, TC controllers shall not vector these departures before GWE unless there are over-riding safety reasons. Should it be necessary to vector aircraft before point GWE during these hours, the controller shall log the reason with the TC GS North who shall record it in the Handover Log.
- Daytime - Where there is no immediate interaction with the Luton departure, the aircraft should be left on the SID and not vectored until the aircraft is east of vectoring point GWE. Non-Luton aircraft shall not be delayed through keeping Luton departures on the SID until GWE.

Whilst the majority of aircraft track within the swathe it can be seen from the track dispersion and density plots provided, as part of the PIR requirements, that ATC vectoring does occur prior to the railway line however this is done in line with the approved procedure and details are recorded with TC GS North. The airport also liaises regularly with NATS TC to understand the reasons for vectoring occurrences and to ensure these occurrences are kept to a minimum.

In summary London Luton Airport Operations Ltd believes that the RNAV procedure implemented has delivered on its objectives.

Best regards



Flight Operations Manager
London Luton Airport Operations Ltd.

