

Portable Noise Monitor Report:

Barston

12th June – 12th July 2018



Report Title: Barston Noise and Overflights Study 2018

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1. Background

The Barston Noise and Overflights Study was conducted between 12th June and 12th July 2018 (inclusive).

The Portable Noise Monitor (PNM) had been deployed at a resident's property located on Barston Lane for the purpose of a Noise Abatement Departure Procedure (NADP) trial which saw a small number of aircraft were using different departure profiles. In January and February 2018 aircraft were using a procedure known as NADP 1 and in March and April 2018 aircraft were using a procedure known as NADP 2. The results of the NADP Trial will be available in early 2019 along with further information on the different procedures.

The PNM was also deployed in Barston between 12th June and 12th July 2018 to record 'normal operations' (i.e. when airlines were not requested to fly NADP1 or NADP2) to understand the typical noise levels experienced at this location. It was agreed that Birmingham Airport would analyse the data collected from the PNM during 'normal operations' separately and the data has been made available in this report.

The Barston area is typically overflown both by arrivals onto runway 33 and departures from runway 15 and is located approximately 2.9 miles from the southern end of the runway. (see Appendix A for location map).

As well as using the Airport's PNM to identify aircraft noise levels in the local vicinity, the Airport Noise and Operations Monitoring System (ANOMS) was used to monitor flight tracks over the area and assess the number of aircraft operating in the Barston vicinity.

2. Methodology

The PNM was deployed into the resident's garden on Barston Lane and was positioned approximately 2.9 miles from the end of the runway.

The Airport Company confirmed the suitability of the location - that there was clear access to power and there were no barriers which might reflect or absorb noise. In order to mitigate against community noise events triggering a noise reading, the noise threshold for the PNM was set at 65 dB(A).

The study into the overflight of Barston was undertaken using ANOMS. The ANOMS system integrates secondary radar data with noise data captured at six permanent noise monitors located in the local community; it will also correlate noise from the PNM with specific aircraft operations.

3 Results

Noise Study

Analysis of the data collated shows that Barston experiences noise from both departing aircraft from runway 15 and arriving aircraft onto runway 33. These operations are therefore discussed in greater detail below.

Discussion of noise results – Departures from Runway 15

The majority of aircraft on departure from runway 15 use RNAV (Area Navigation) Standard Instrument Departure (SID) procedures. RNAV procedures use satellite technology to navigate aircraft through a series of waypoints. The use of satellite technology allows aircraft to operate with increased accuracy when compared to using conventional procedures. The SID is a set of published instructions and is designed to provide safe entry from the airport to the UK airways system.

Constructed around the SID are Noise Preferential Routes (NPRs) which for aircraft departing from runway 15 using RNAV departure procedures are represented by a swathe 2km in width. Aircraft must remain within the NPR until an altitude of 3000ft has been achieved when departing on route P6 (referred to as the northbound turn) and 4000ft for those departing using route P1 (and heading south). The NPR's and 'P' routes for aircraft departing from runway 15 can be found in appendix B.

There are also a small number of aircraft that depart on a southerly heading using a non-standard departure procedure and use a route known as P21 which is also commonly referred to as MOSUN. MOSUN is typically used by aircraft heading to destinations such as Portugal and the Canary Islands as it avoids the congested London Airspace and provides a shorter routing. Its availability is however restricted due to some airspace to the west of the Airport that MOSUN uses not always being available for commercial operations.

During the study period just 4% of those aircraft departing in a southerly heading used MOSUN. The MOSUN procedure is designed to closely replicate the P6 route and it is unlikely that residents in Barston would distinguish between aircraft using either routing.

Southbound SID's (routes P1 & P21)

The results of the noise analysis identified that 91.3% of aircraft departing from runway 15 on southerly headings registered noise levels above the 65dB(A) threshold set up for the PNM.

Of the 1148 registered noise events, the noisiest operation registered 82.7 dB(A) at the PNM. This aircraft was an Airbus 380 (A380) on departure from runway 15, and it operated according to recommended standard procedures.

The average altitude of aircraft operating in the Barston vicinity using route P1 is 2,715ft however the A380 identified operated at an altitude of 1,830ft and it is likely that this low altitude contributed towards the noise level recorded.

These results can also be compared to a noise study that was carried out by Birmingham Airport in 2013 at a nearby location in Barston. The 2013 study showed that 62.17% of aircraft departing using routes P1 and P21 registered events on the noise monitor. There has therefore been an increase in departure noise events registering on the noise monitor of 29.13%. This increase is primarily due to the introduction of RNAV departure procedures which has led to a greater concentration in aircraft overflying the Barston vicinity.

Northbound SID's (route P6)

The results of the noise analysis identified that 37.8% of aircraft departing from runway 15 on northerly headings registered noise levels above the 65dB(A) threshold set up for the PNM.

Of the 153 registered noise events, the noisiest operation registered at the PNM was 78.9 dB(A). This aircraft was an Antonov 12 (AN-12) which left the NPR at an altitude of 2979ft and did not fly the intended track on this route. Aircraft are required to remain within the NPR until an altitude of 3000ft has been achieved and this operation left the NPR below the requisite altitude. The track flown by the AN-12 can be seen in appendix C.

When Birmingham Airport introduced new flightpaths for aircraft departing from runway 15 in May 2014, it was identified that a small number of aircraft types flew closer to communities including Barston than was anticipated when using route P6. The primary aircraft types that were identified as doing this was the Boeing 757 as well as turbo-prop aircraft such as the Dash-8 and AN-12.

Birmingham Airport made a commitment to make technical amendments to the design of the 'northbound turn' with our procedure designers. This redesign work has been completed and aims to try and better concentrate all aircraft types on the Noise Preferential Route (NPR) centreline.

The amended designs have been submitted to our regulator the Civil Aviation Authority for their independent review. The Airport anticipates a response from the CAA in early 2019 and until this review is completed we are unfortunately unable to implement any changes.

It is anticipated that this redesigned procedure would lead to a further reduction in the overflight of Barston by aircraft using route P6 and there would subsequently be a reduction in the noise experienced.

These results can also be compared to the noise study that was carried out by Birmingham Airport in 2013 at a nearby location in Barston. The 2013 study showed that 67.6% of aircraft departing on a northerly heading registered events on the noise monitor. There has

therefore been a decrease in departures on northerly headings, registering noise events on the monitor of 29.8%. This decrease is primarily due to the introduction of new departure procedures which has concentrated aircraft departing from runway 15 on a northerly heading further to the east of Barston.

Northbound & Southbound SID's Combined

The results of the noise analysis identified that overall 78.23% of aircraft departing from runway 15 utilising Birmingham Airports Standard Instrument Departure (SID) routes registered noise levels above the 65 dB(A) threshold set up for the PNM. This is an increase of 14.09% when compared to the 2013 Barston Study where 64.14% of aircraft registered noise events on the PNM.

Discussion of noise results - Arrivals

When runway 33 is in operation arriving aircraft will pass to the east of Barston as they descend into Birmingham Airport, typically using the Instrument Landing System (ILS).

The ILS is a highly accurate system that enables aircraft to land safely on the runway, including at night and in poor visibility. It consists of two radio signals transmitted from the airfield.

The *localiser* establishes the centreline of the runway and defines a straight line approach path which extends out from the Airport for around twenty miles.

The *glide slope* beam defines the *glidepath*, the angle at which the aircraft descends, enabling it to fly along the localiser beam in a controlled descent, clearing all obstacles along the way, until it touches down safely on the runway.

The angle of the glide slope is 3°, which means an aircraft will descend at approximately 300 ft for every mile it travels.

Arriving aircraft were also identified to be a source of noise. The results of the noise analysis identified that 82.7% of aircraft arriving onto runway 33 registered noise levels above the 65dB(A) threshold set up for the PNM.

Of the 2865 registered noise events, the noisiest operation registered 82.8 dB(A) at the PNM. The aircraft was a Boeing 757-200 which operated in accordance with standard procedure. Having replayed the audio file for this operation there was an audible change in power settings which is likely to have contributed towards the measured noise level.

The only other aircraft type to register a noise event above 80 dB(A) on arrival was a Boeing 737-400 which registered 80.1dB(A).

These results can also be compared to a noise study that was carried out by Birmingham Airport in 2013 at a nearby location in Barston. It should however be noted that the 2013 study took place before Birmingham Airports runway extension and before the landing threshold was changed in 2014. As a result, arriving aircraft during the 2013 study were approximately 58ft higher on their final approach when compared to the 2018 study.

The 2013 study showed that 93% of aircraft arriving on to runway 33 registered events on the noise monitor. There has therefore been a decrease in arrival noise events registering on the noise monitor of 10.3%. This decrease is primarily due to the increase in Dash-8 aircraft operating at Birmingham Airport which regularly registered below 65 dB(A) on the PNM. During the 2013 study Dash-8 aircraft accounted for just 4.8% of all arrivals, however during the 2018 study the Dash-8 accounted for 20% of all arrivals.

The analysis of all noise data can be found in Appendix D.

Overflights Study

Analysis of the overflights data was conducted for all aircraft operations. This was achieved by setting up a gate over Barston 2km in diameter in order to count the number of aircraft that overflew the area. A total of 4559 aircraft operated in the Barston vicinity during the study period. All of these aircraft were operating to or from Birmingham Airport.

Departing Aircraft

In terms of departing aircraft, there were 1015 departures from runway 15 aircraft that flew through the gate. 249 of these aircraft were on a northerly heading using route P6 and 766 of these aircraft were on a southerly heading using route P1.

The average altitude of aircraft using route P6 in the Barston area was 2,846ft and for aircraft using route P1 the average altitude was 2,715ft.

Arriving Aircraft

In terms of arriving aircraft, there were 3545 aircraft that flew through the gate on arrival to runway 33. The average altitude of these aircraft was 1,379ft when they were adjacent to Barston.

The analysis of the overflight data can be found in Appendix E.

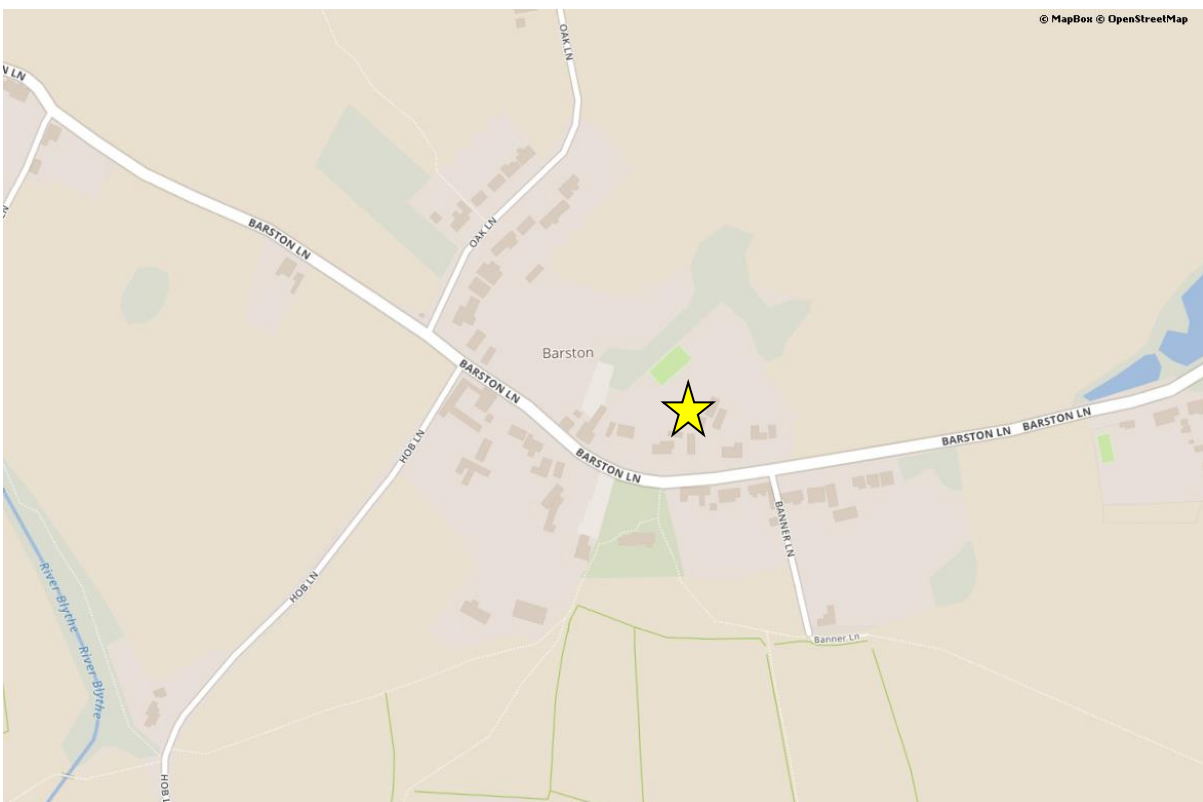
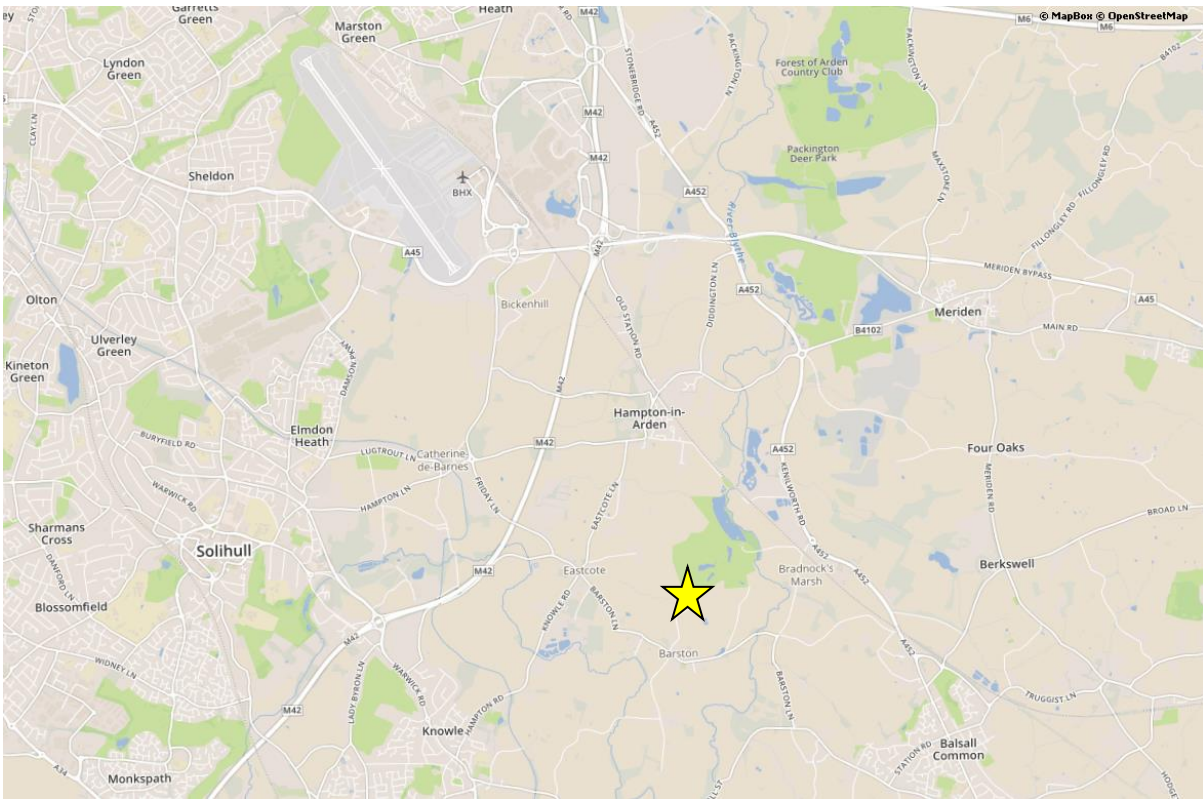
4. Conclusion

Managing the impact of noise is given high priority at Birmingham Airport. Aircraft noise has long been recognised as a sensitive issue for local communities and as such, a comprehensive noise management programme has been in existence for many years.

Whilst minimising and mitigating noise in the Barston vicinity is very challenging due to its close proximity to the runway end Birmingham Airport is committed to investigating all practicable means to do so. It is with this in mind that the trial of Noise Abatement Departure Procedures took place in order to understand whether these procedures could offer any benefit to communities located close to the runway end. The results of this trial will be published in early 2019.

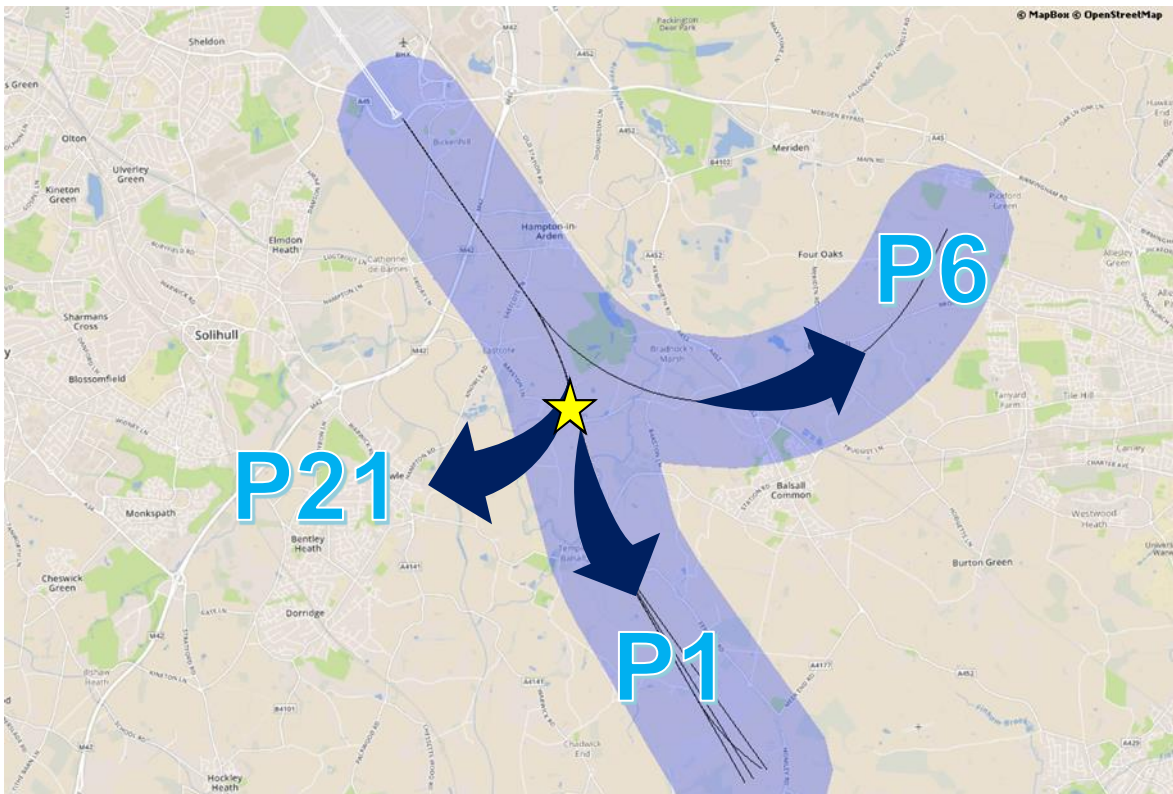
5. Appendices

Appendix A – Location of PNM



 Illustrates the approximate location of the PNM

Appendix B – Runway 15 Standard Instrument Departure Routes (SID's)

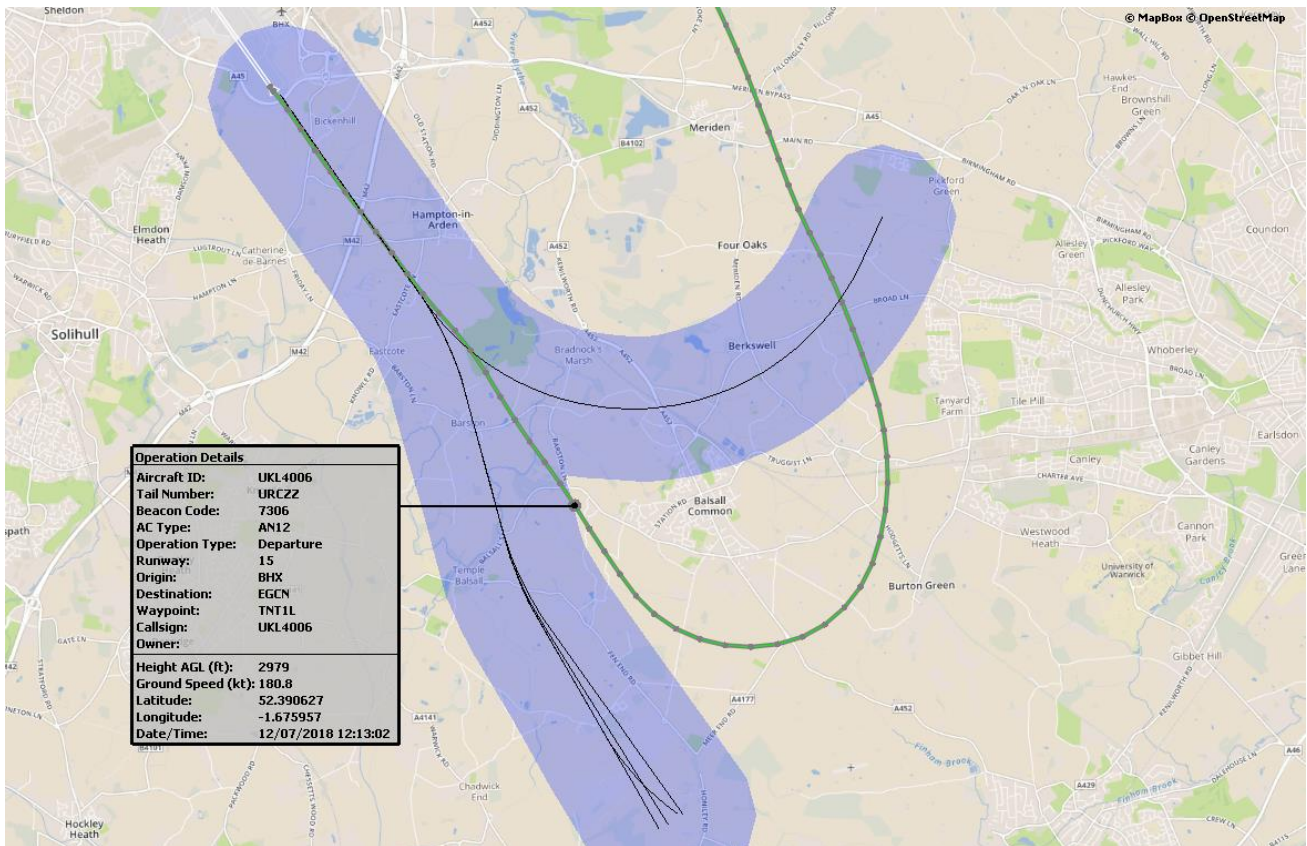


Key

★ = Illustrates the approximate location of the PNM

■ = Noise Preferential Route

Appendix C – Antonov-12 Noise Preferential Route (NPR) Deviation



Key

★ = Illustrates the approximate location of the PNM

■ = Noise Preferential Route

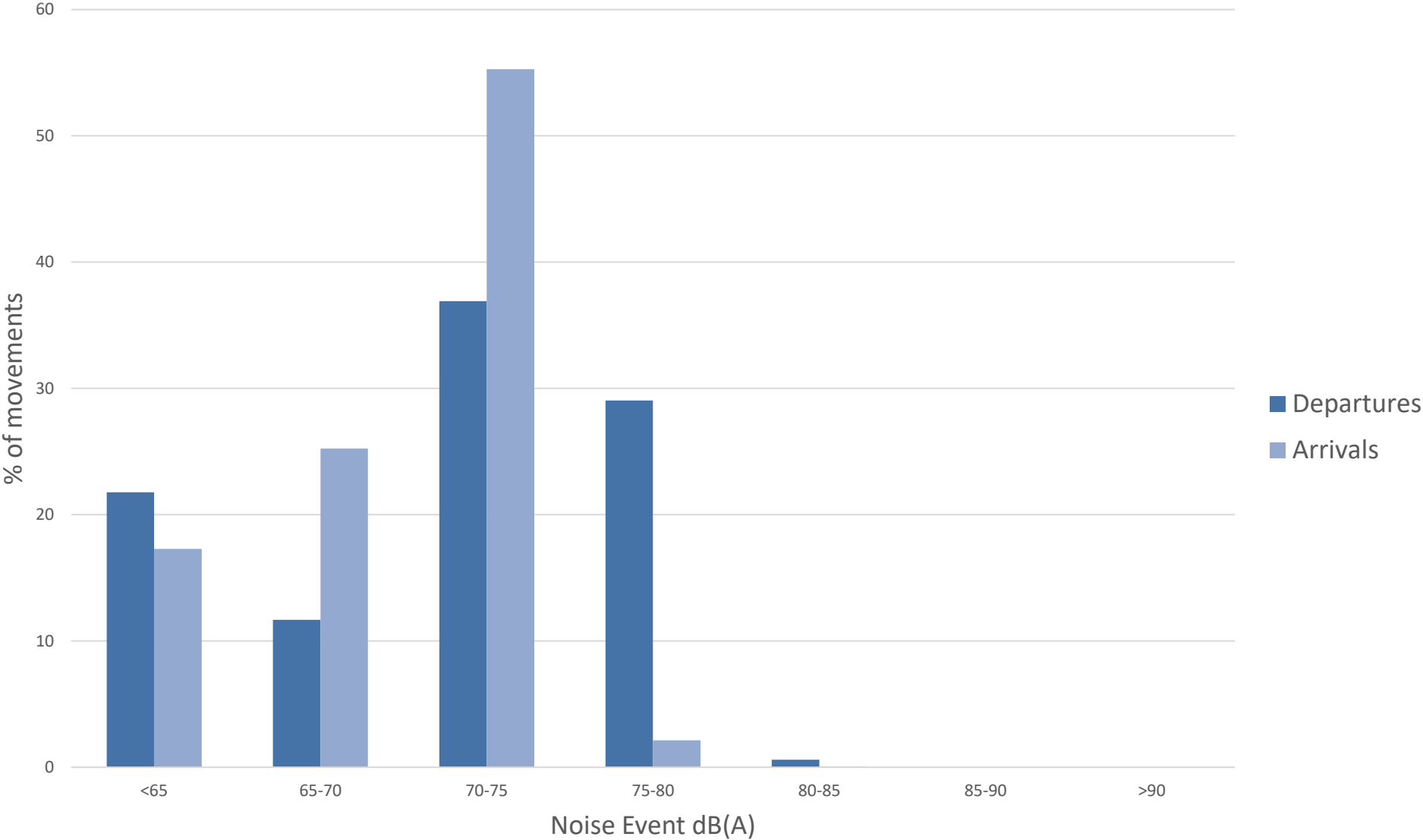
— = Antonov Operation

Appendix D – Analysis of Noise Data

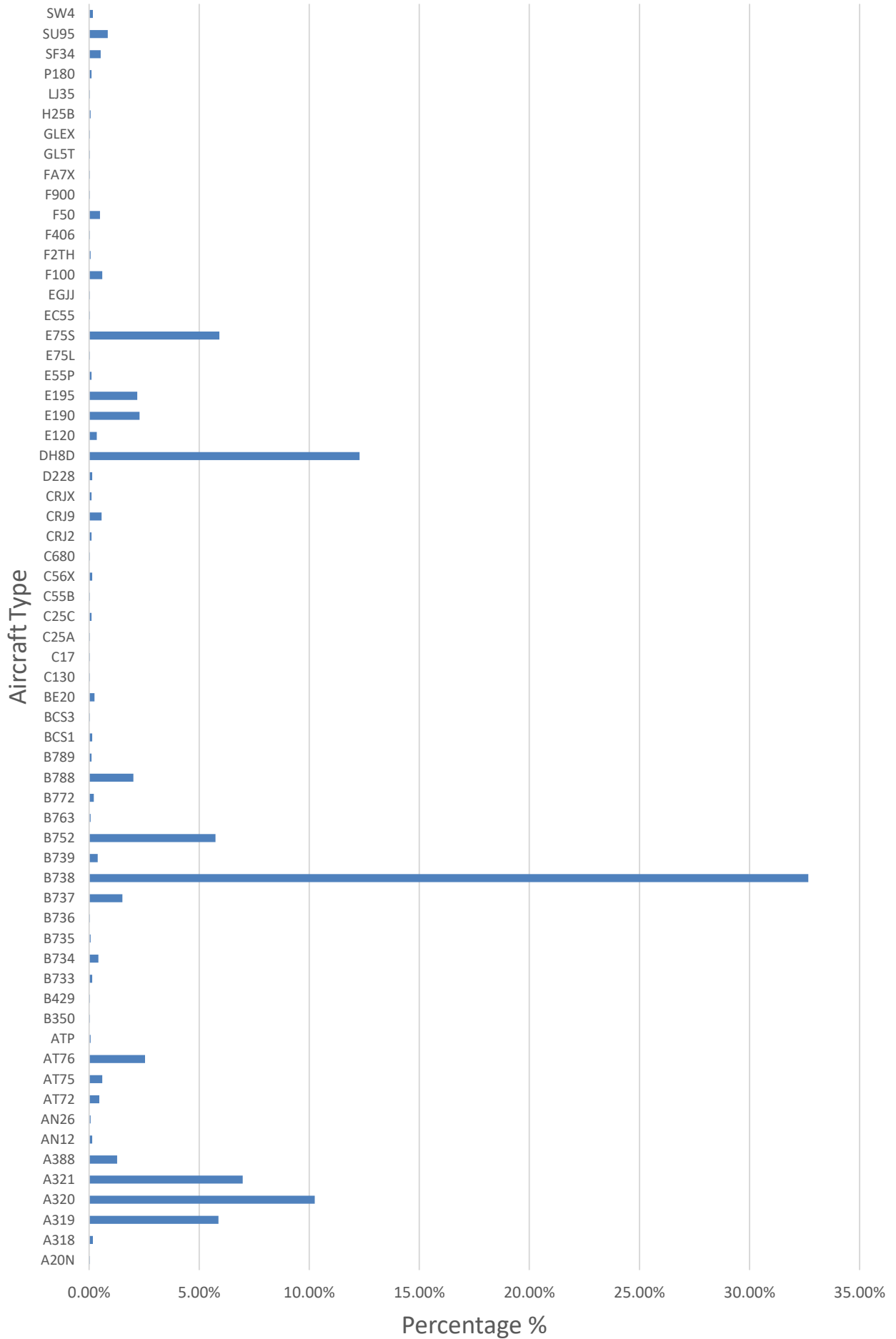
Noise Events

	Total Operations	Noise Event dB(A)													
		<65		65-70		70-75		75-80		80-85		85-90		>90	
		Total	(%)	Total	(%)	Total	(%)	Total	(%)	Total	(%)	Total	(%)	Total	(%)
Departures Runway 15	1663	362	21.77	194	11.67	614	36.92	483	29.04	10	0.6	0	0	0	0
Arrivals Runway 33	3464	599	17.29	874	25.23	1915	55.28	74	2.14	2	0.06	0	0	0	0

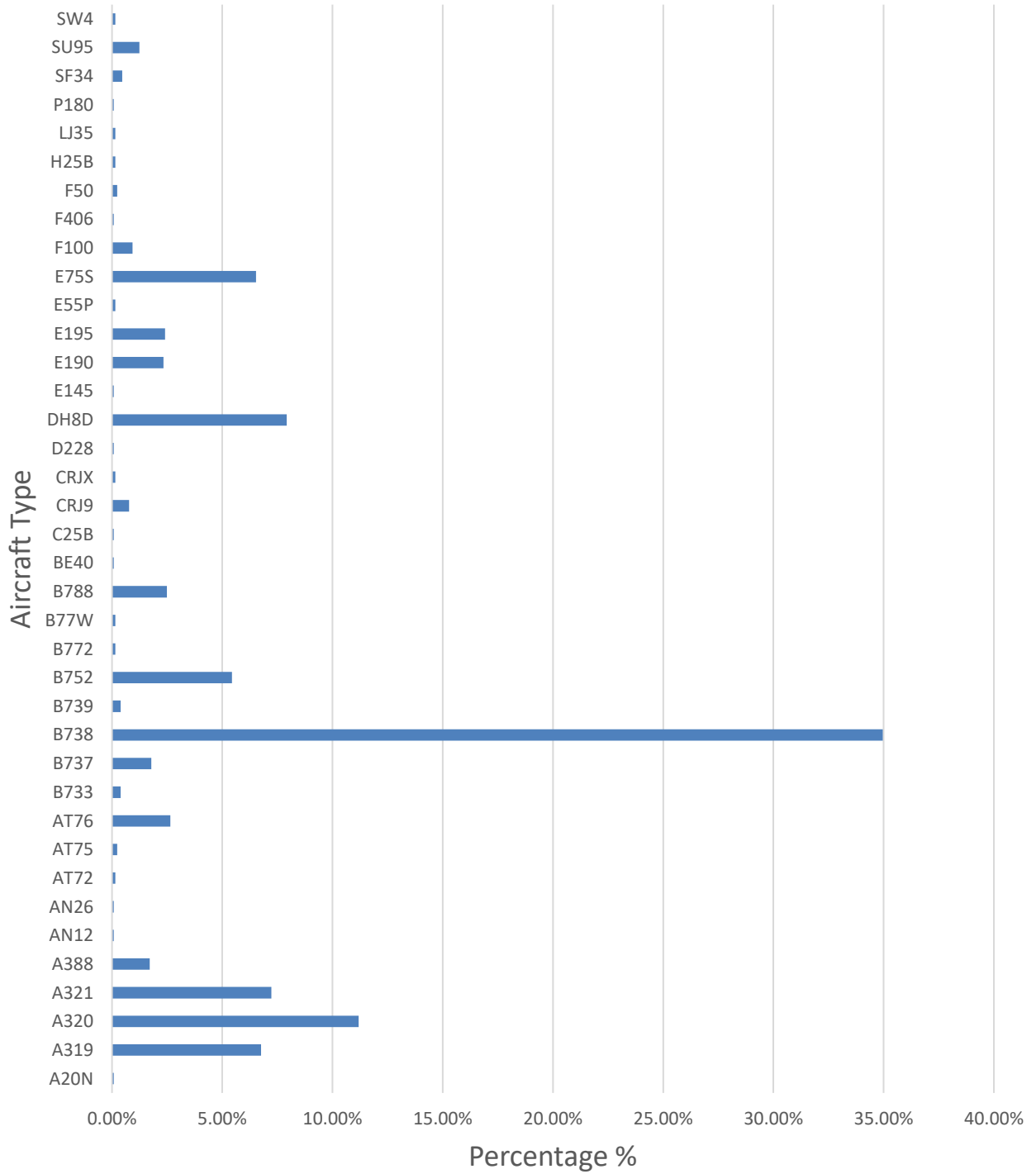
Noise Band Reading's % of ATM's



% of Arrivals registering Noise Events



% of Departures registering Noise Events



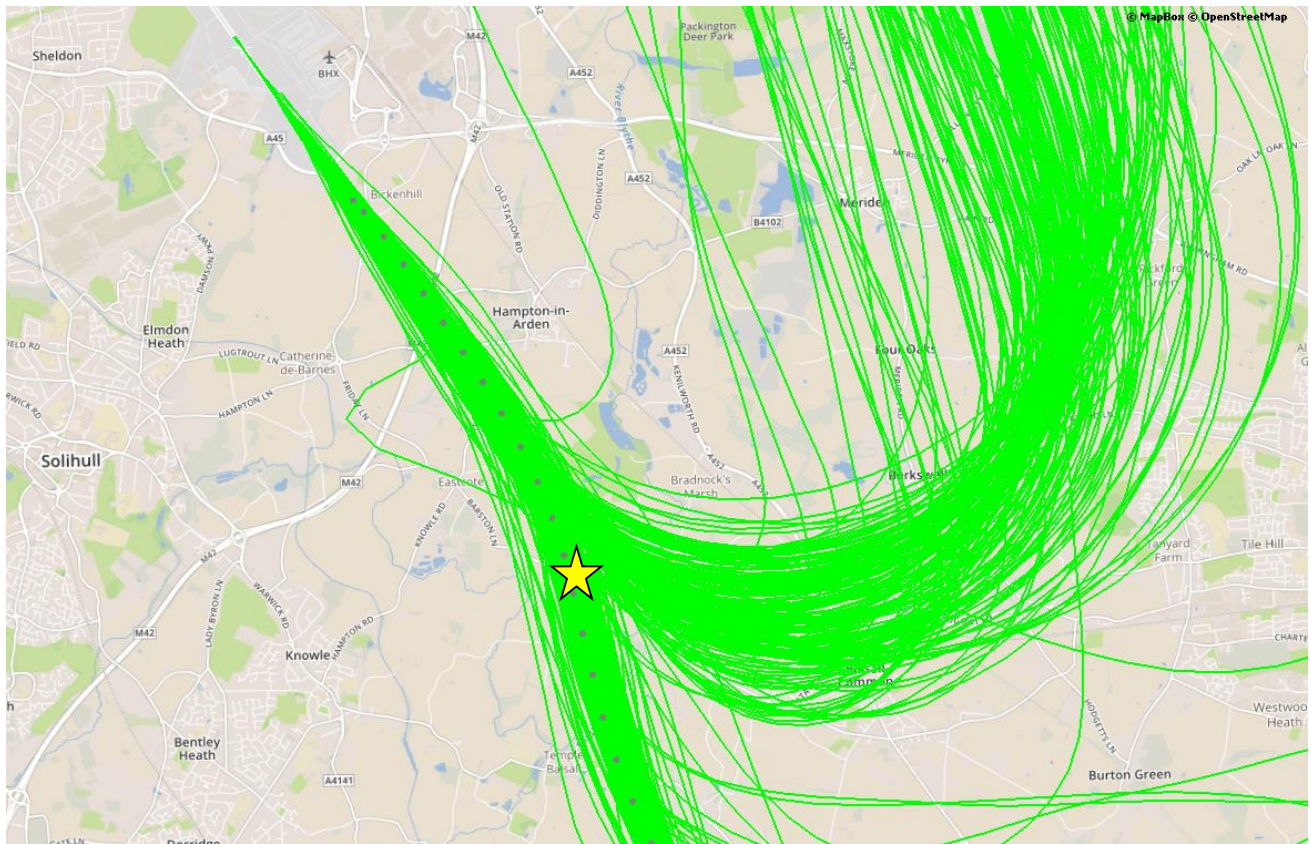
Appendix E – Overflights Data

BARSTON OVERFLIGHTS RESULTS



Table showing overflights of Barston by **Arriving and Departing** Aircraft

	Total Number of Departures	Total Number of Arrivals	%
Runway 15	1014	0	22%
Runway 33	0	3545	78%

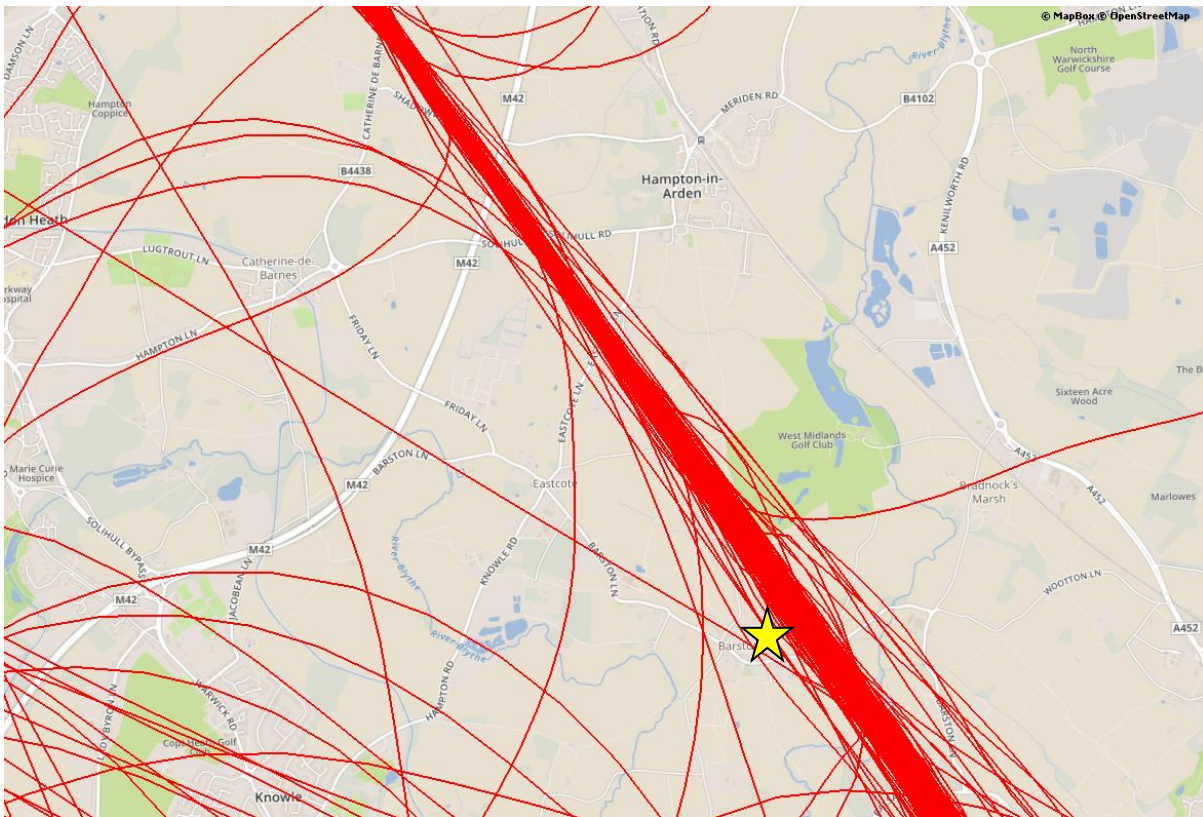
Departing aircraft during the study period





Key

-  = Illustrates the approximate location of the PNM.
-  = Departing aircraft tracks

Arriving aircraft during the study period



Key

-  = Illustrates the approximate location of the PNM.
-  = Arriving aircraft tracks