

Community Mobile Noise Monitoring Report

West Lothian

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1.0 Introduction

During discussions with our neighbouring communities, and in conversations with Edinburgh Airport Noise Advisory Board (EANAB) an interest, and need, to monitor noise out with our fixed noise monitoring stations was identified. With the introduction of our new Noise and Track system (NTK) it was decided that this would be the perfect time to acquire noise monitors which could be easily placed out in our communities and connected into the new NTK to provide extensive and robust data.

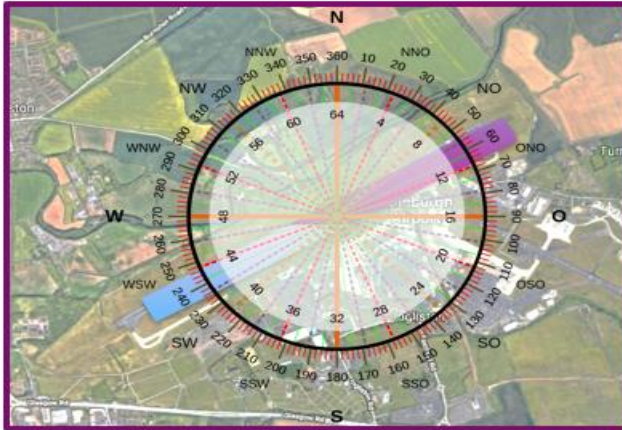
Edinburgh Airport has three permanent fixed noise monitors sited within close proximity to the runway. The noise monitors at these sites are used for fining aircraft when the noise they make exceeds the levels we would expect for that time of day.

Mobile noise monitoring equipment can be sited within garden areas of volunteer properties allowing us to monitor noise levels within neighbourhoods. The mobile noise monitors are installed at volunteer properties for between two to four weeks, dependant on the number of noise measurements captured. Due to the location of the volunteer properties, the number of noise measurements captured will vary. Many of the monitoring locations are not directly under a flight path and the further away from the airport the monitor is placed, the more dispersed the aircraft become.



Flight Paths

Edinburgh Airport has one primary runway (Runway 06/24), which operates in two directions. When Runway 06 is in operation, aircraft arrive from the west and depart to the east. When Runway 24 is in operation, aircraft arrive from the east and depart to the west.



The direction of operation is entirely dependent on weather conditions as, where possible, aircraft will take off and depart into wind. Changes in runway use can happen at any time. Due to local weather conditions (south-westerly is the prevalent wind direction at Edinburgh Airport), R24 is in operation approximately 70% of the time and R06 is in operation approximately 30% of the time.

Arriving aircraft

Arriving aircraft do not have a specified route to follow before joining the Instrument Landing System (ILS). The ILS is the system that Pilots use to safely line up with our runway. They will be advised, also known as 'vectored', by Air Traffic Control (ATC), to follow a safe route on approach, this means there is more variation in the position of arriving aircraft.

Aircraft join the final approach at heights consistent with the use of the ILS, however, pilots are generally instructed to maintain an altitude of at least 2,500 feet until they are turned towards the ILS by ATC.

Departing aircraft

Standard Instrument Departure routes or SIDs are a set of instructions which a pilot will refer to when departing from the airport. These routes are not compulsory, they are there to ensure that all departures are safe and efficient.

Our current SIDs are

- GRICE
- TALLA
- GOSAM

The SID names change dependant on wind direction and the runway in use, and the SIDs then become

- 24GOSAM
- 06GOSAM
- TLA6C (TALLA runway 24)
- TLA6D (TALLA runway 06)

- GRI3C (GRICE runway 24)
- GRI4D (GRICE runway 06)

In the 1970s, when Runway 06/24 was designed and built, SID development was not as rigorous or sophisticated as it is today. There was limited technology, so instructions were simple, involving directions to be taken once an aircraft had reached a certain height or travelled a certain distance.

SIDs are depicted as lines on maps, however, recognising that aircraft are unable to follow this line exactly, aircraft fly within a corridor known as a Noise Preferential Route (NPR).

Noise Preferential Routes (NPR) are corridors, extending one mile in each direction from the center of the SID line, which aircraft are expected to fly in when departing from the airport. NPRs are not a statutory control but are used to reduce noise disturbance on our local communities.

Departing aircraft are required to follow the NPR until they reach an altitude of 3,000ft, or 4000ft for jets on GRI3C. When they reach the appropriate altitude, they can depart these routes and fly towards their destination. Since July 2015, to alleviate noise intrusion in the Uphall area, we raised this height/turn level to 4,000ft for jet aircraft.

Further information on our current SIDs may be found via our Noise Lab website below
<https://noiselab.casper.aero/edi/#page=home>

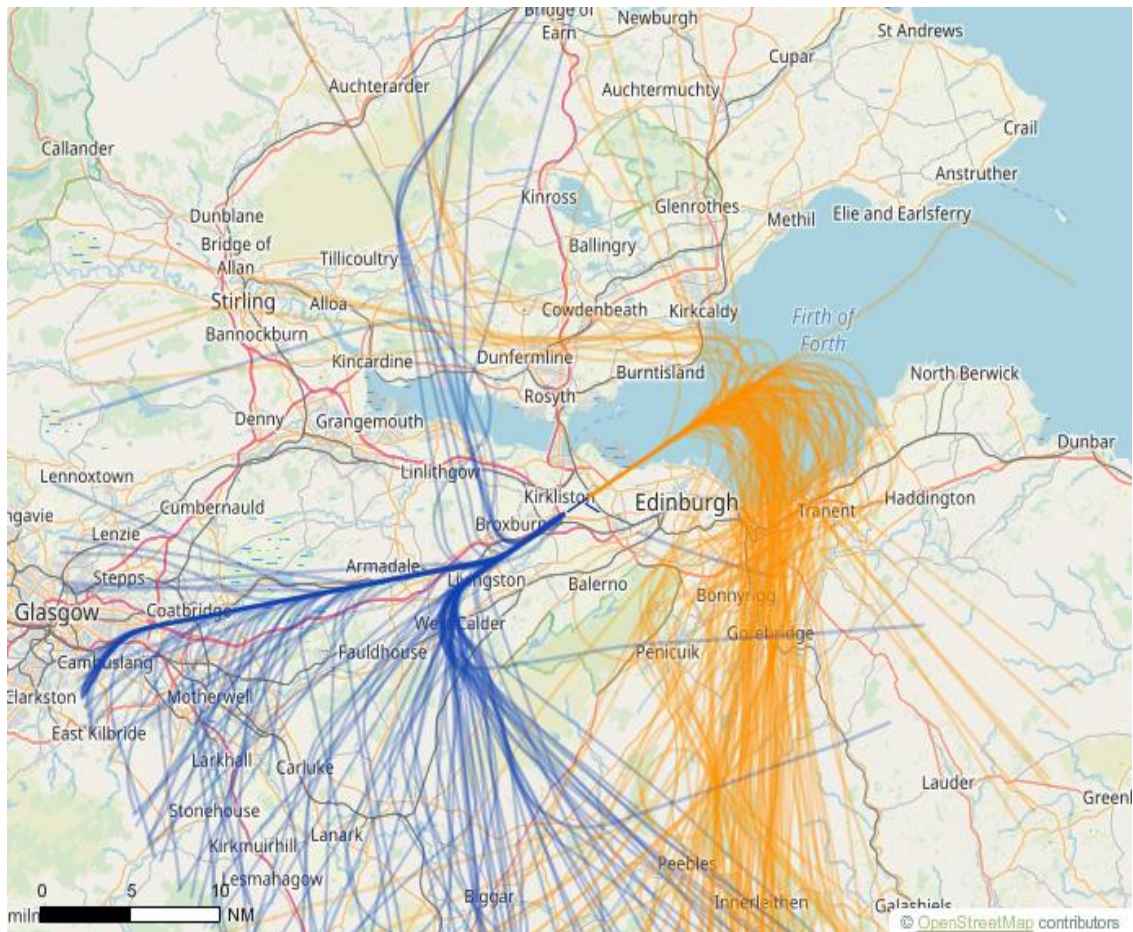
Please note that SIDs are only used for departing aircraft, arriving aircraft do not have SIDs and NPRs.

Runway Usage

Image 1

Runway 24

Shows typical runway usage spilt and the current Standard Instrument Departures often shortened to SIDs for Runway 24 arrivals and departures

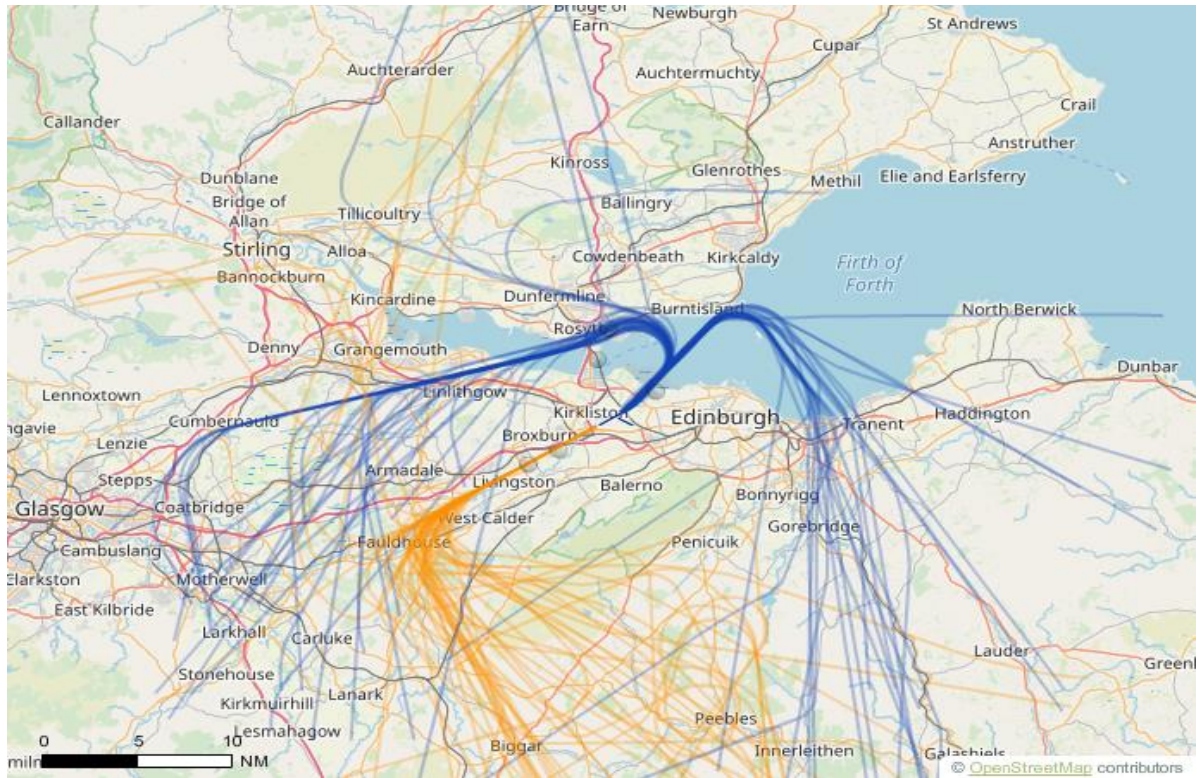


Blue lines show departures, orange show arrivals

Image 2

Runway 06

Shows typical runway usage spilt and the current SIDs for Runway 06 arrivals and departures



Blue lines show departures, orange show arrivals

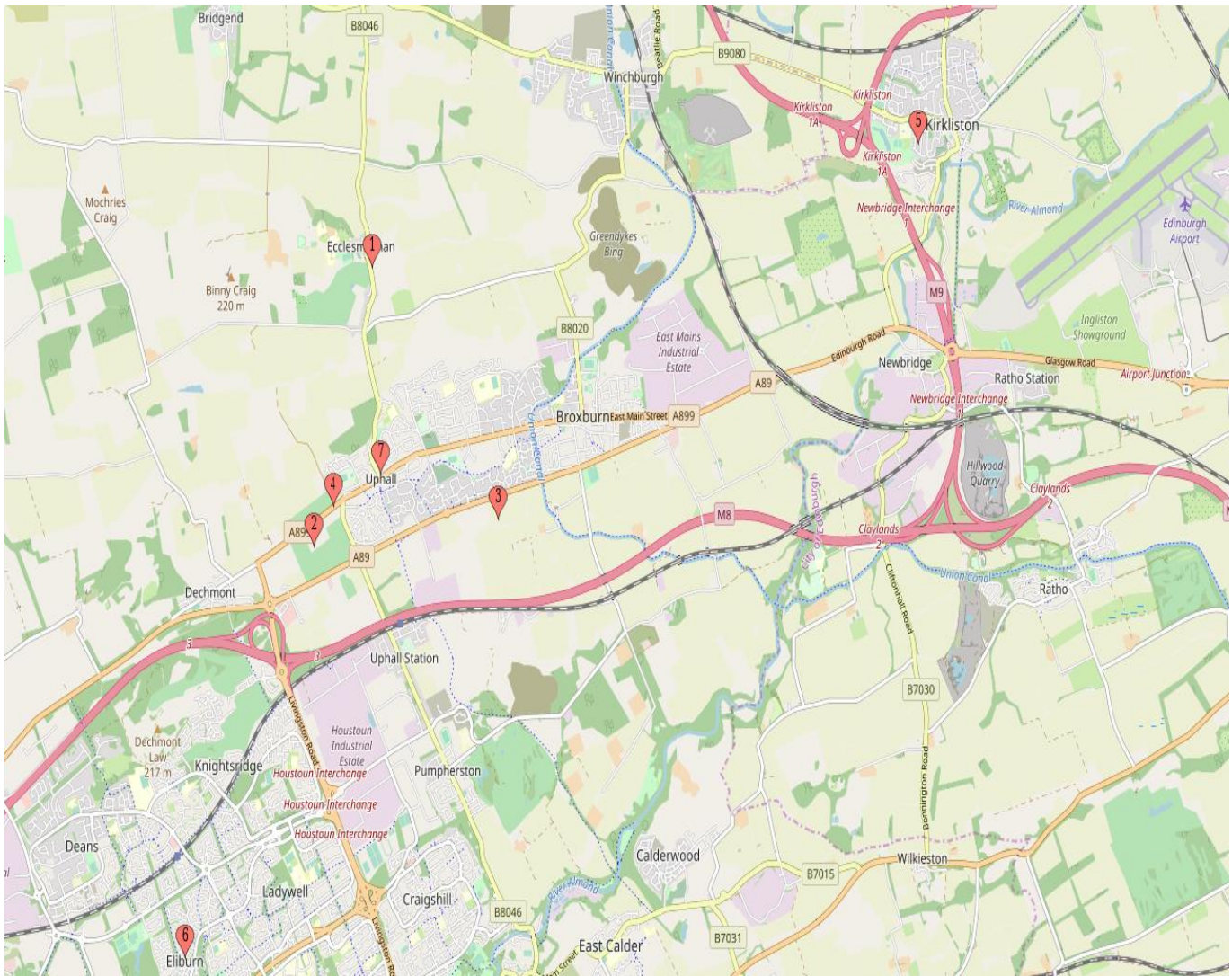
2.0 Noise monitor siting

Monitors were sited at the locations detailed below. The monitors measured noise from departures along the 24 Standard Instrument Departure Route (SID) and arrivals via Runway 06.

- Location 1
Ecclesmachan, EH52 6xx.
The noise monitor was located in a garden area which was in the main surrounded by fields, the front of the property faced onto what is at rush hour a moderately busy road.
Dates of installation: 09/10/2018 – 09/12/18
- Location 2
Uphall, near golf club, EH52 6xx.
The noise monitor was located to the side of the property, surrounded by woodland and the golf course.
Dates of installation: 09/10/2018 – 09/12/18
- Location 3
Broxburn, EH52 5xx.
The noise monitor was located to the side of the property, this is a semi-rural location however the property sits close to the A89, this is a busy road which can become significantly congested during rush hour.
Dates of installation: 09/10/18 – 09/12/18
- Location 4
Uphall, EH52 6xx.
The noise monitor was placed in the rear garden area of this property, this location was within a residential street, and near the A899 a busy main road through the town of Uphall. This location is occasionally overflowed by either turbo prop aircraft on a GRICE3C SID or by aircraft that have been diverted off-track for weather or other operational reasons.
Dates of installation: 21/02/19 – 08/03/19
- Location 5 Kirkliston, EH29 9xx
The noise monitor was placed in the rear garden area of this property, this location was within a residential street.
Dates of installation: 21/02/19 – 08/03/19
- Location 6
Eililburn, Livingston, EH54 6xx,
The noise monitor was placed in the rear garden area of this property, this location was within a residential street.
Dates of installation: 21/02/19 – 08/03/19
- Location 7
Uphall, Livingston, EH52 6xx,
The noise monitor was placed in the rear garden area of this property, this location was within a residential street close to the B8046.
Dates of installation: 19/03/19 – 02/04/19

The sites were chosen for their location and the suitability of the garden area. However, sites were limited to those where the land owners volunteered to host mobile noise monitoring equipment for the monitoring of aircraft noise. Due to the locations of some of the monitoring sites, the number of noise monitoring events captured were very low, while in other locations closer to the flight paths the number of events captured was much higher. At those sites where few aircraft noise events were captured the data collected was still useful, as it provides us with the normal background and average noise levels within that location and area.

Image 2 noise monitor locations.



3.0 Noise and Track System Data (NTK)

Noise data from mobile noise monitoring equipment. The mobile noise monitors (NMT) gather data in the same way as our fixed noise monitoring stations and use the same make and models of noise monitors to obtain the data.

Our Noise and Track System (NTK) has a direct connection to both our raw radar feed (as used by our Air Traffic Controllers) and to our operations data base which details each aircraft callsign, make model, airline, operator, etc. The mobile noise monitors connect into this NTK system and this allows the NTK system to identify the aircraft with the noise created at the monitoring point and dismiss other noise sources. The monitors collect data continuously and send this direct to the NTK system, updating it continuously.

4.0 Analysis of Noise Monitoring Survey Results

The data we obtained from the mobile monitors enables us to assess the noise climate in an area even when aircraft are not overhead. In the following tables and graphs you will see noise represented in a number of different ways. A more technical descriptions of each noise monitor parameter used is available in section 5.0.

Average daily noise levels when aircraft are NOT overhead, is called the ‘**ambient**’ noise level, this is measured and averaged out over a time period. In this report the periods measured are day and night.

This type of averaged measurement is called **LAeq**, it is the most frequently used environmental noise measurement.

One of the ways we measure aircraft noise is again measure the average as we would for ambient noise levels, in the tables further on in this report the average **LAeq Aircraft** is the average LAeq when aircraft ARE overhead.

Relating and comparing noise levels can be quite confusing. However, we have provided the average noise levels (LAeq) for some common everyday activities below to assist in giving you an understanding of this type of noise measurement

- A whisper 20 – 30 dB
- A quiet library – 35dB
- Normal conversation between two people – 55 – 60dB
- A lawn mower – 90dB
- Loud rock music concert – 120dB

This type of noise measurement **LAeq**, is used in a different way in the development of contour mapping for our Noise Insulation Scheme, this contour mapping helps us determine if assistance should be offered to properties close to the airport. However, for this type of contour mapping, data from the full summertime period is used to calculate the LAeq, rather than a 2–3 week period as used for our mobile noise monitoring LAeq. Unfortunately, the two types of LAeq measurements cannot be directly compared.

Although the average level of aircraft noise may be much lower than the average level of the total noise at a site, each individual aircraft noise event, whenever it occurs, is likely to be clearly audible, and distinguishable from the ambient noise at the site. This is because, in addition to being different in character, it results in a noticeable increase in the level of noise over the ambient noise level during each event.

A summary of the main noise related parameters for all sites is given in the section below.

L_{Aeq} is a good way of understanding how noise is experienced in a community over a period and it is recognised internationally as the accepted method for measuring and quantifying environmental noise.

In addition to the L_{Aeq}, the maximum noise level of each individual aircraft is measured, . As the aircraft flies overhead, the noise level is measured at the monitoring station. Unlike average noise levels L_{Aeq} this type of measurement measures the noise from an individual aircraft as it passes over the microphone. It takes a measurement as the airplane reaches its loudest point and this is called the L_{max}. **L_{max}** can most simply be described as the loudest noise recorded as the aircraft passes over the

Sound Exposure Level (SEL) is a measurement of energy that takes into account both the level and duration of the noise exposure this is a measurement which is calculated mathematically. The calculation is carried out by the noise monitor.

5.0 Noise parameters detailed within this report

Noise measurement is a complicated subject and measurements can be taken in a number of ways to represent different things, as described in the previous section. Below is a technical description of the noise parameters used with in this report

Decibel dB: This is the unit of measurement used for sound pressure levels and are usually quoted in decibels (dB). The decibel scale is logarithmic rather than linear. The threshold of hearing is zero decibels while, at the other extreme, the threshold of pain is about 130 decibels.

In practice, these limits are seldom experienced and typical levels lie within the range of 30 dBA (a quiet night-time level in a bedroom) to 90 dBA (at the kerbside of a busy street).

A weighting: In addition to its non-linear amplitude response, the human ear has a non-linear frequency response; it is less sensitive at low and high frequencies and most sensitive in the range 1 kHz to 4 kHz (cycles per second). The A-weighting is applied to measured sound pressure levels so that these levels correspond more closely to the subjective response. A-weighted noise levels are often expressed in

L_{max}: The maximum A-weighted level measured during a given time period, T.

L_{Aeq}: The equivalent continuous sound level L_{Aeq}, T is the level of a notional steady sound, which at a given position and over a defined period of time, T, would have the same A-weighted acoustic energy as the fluctuating noise.

Ambient Noise level: Ambient noise is the total sound in a given situation at a given time usually composed of sound from many sources, near and far.

SEL: Sound exposure level abbreviated as SEL, is the total noise energy produced from a single noise event. The Sound Exposure Level is a metric used to describe the amount of noise from an event such as an individual aircraft flyover. It is computed from measured dBA sound levels. The Sound Exposure Level is the integration of all the acoustic energy contained within the event. The dB(A) level which, if it lasted for one second, would produce the same A- weighted sound energy as the actual event

LA90 or Background noise level: The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time period, T.

Lnight: The LAeq night time measurement, taken for the 8-hour period 23:00 – 07:00, this is sometimes shown in noise monitoring reports as LAeq (8 hour)

Measurement periods with in this report:

For noise fining and other areas of noise measurement Edinburgh Airport determine the daytime period to be from 06:00 to 23:30 and the night-time period to be 23:30 to 06:00 use the. However for this noise monitoring report, we have used the most common definitions of day and night as detailed below, these time periods are also used with in World Health Organisation recommendations

- Daytime Ambient LAeq (07:00 - 23:00)
- Night-time Ambient LAeq (23:00 – 07:00)

Location Analysis

The following sections of this report summarise the results of the noise monitoring readings obtained at each location. The results look at not only the different types of noise measurement of aircraft noise and noise which would normally be present (ambient noise levels) at each location but also at the noise levels for particular aircraft types. Where sufficient data is available for the site, analysis has been carried out for both the noisiest aircraft type and the most frequently flown aircraft type in the vicinity of each location.

Tables 1 to 18 provide information on the per day and night for the specific aircraft types at each noise monitoring position

- average background level (L90)
- ambient noise levels
- average aircraft noise level (LAeq)
- average Lmax levels
- average SEL levels

The noise monitoring locations are detailed in Appendix A.

Sections 7 to 9 summarise the findings at all locations with in this report.

6.0 Location Analysis

Image 4 and Image 5 give a snap shot detailing the flight track dispersion of departing flights on runway 24 and altitude of the aircraft respectively during the period 09/10/18 to 03/04/19.

Image 4

Aircraft track dispersal, Runway 24. departures

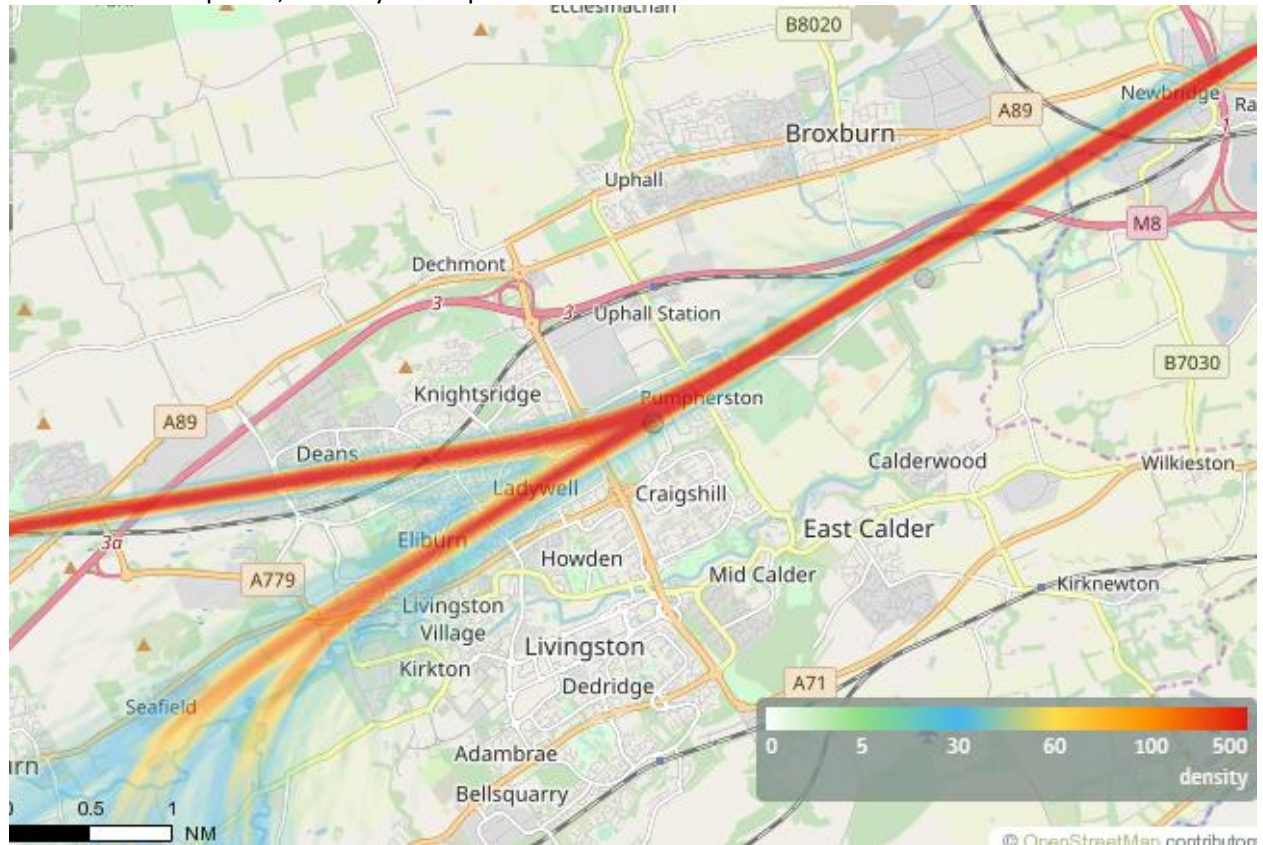
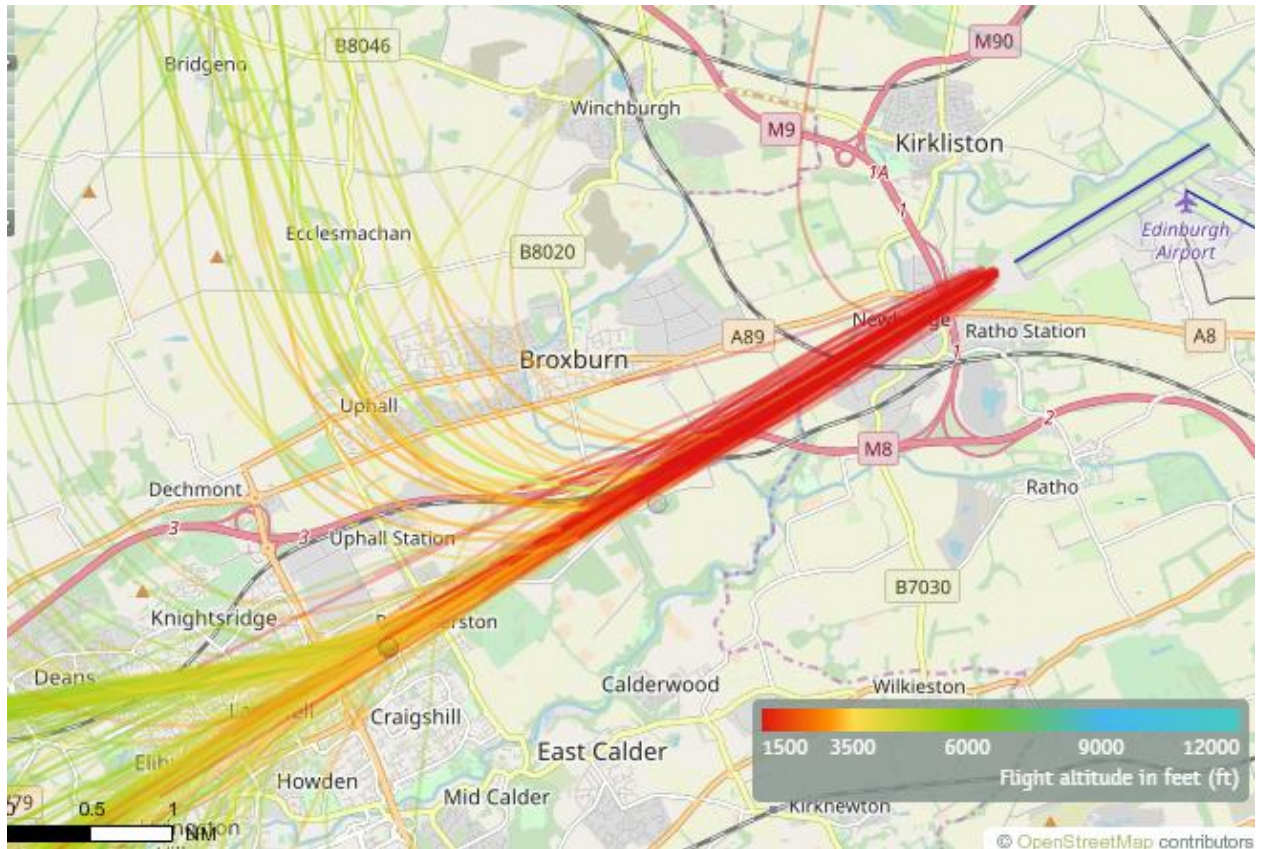


Image 5
Altitude of aircraft, Runway 24. departures



6.1 Location 1 Aircraft Type SF34 LA90, LAeq, SEL, Lnight

Between 02/11/2018 and 09/12/2018 there were 6,125 Departures from Runway 24 during this period, from Edinburgh Airport. Of this total number of departures 258 departed via the GRICE3C SID. This location is only overflown by aircraft on a GRICE3C SID.

The runway split during this period was R24 56% / R06 44 % see Appendix C for table of runway usage.

The most frequent aircraft recorded during this period were SAAB 340 (SF34), 147 of this type of aircraft flew on this flight path during this time period. Of those which overflew this location, or within the vicinity of this location and were recorded by the monitoring equipment, 75 were of this aircraft type. The average duration of each recording was 20 seconds

During this period the monitoring equipment also recorded data from 3 BE20 a small light aircraft and one each of four other aircraft types. Data on those flights will not be analysed for this location as the sample size is not sufficient.

The loudest aircraft was on average was the SF34

During this period the mobile noise monitor recorded a total of

- 87 Aircraft noise events,
- 85 of these were aircraft noise events associated with operations at EDI.
This was composed of 85 Departures from runway 24.

Location details

The noise monitor was located in the garden area of the property. This location was in the town of Ecclesmachan, with minimal background noise generated by road traffic on the nearby B8046, road traffic noise increased during rush hour periods. Other noise which contributed to the background noise was mainly from bird song.

The noise monitor was located in a grassed area with no reflection from roofs or other hard surfaces.

In addition to recording noise events from aircraft movements to or from Edinburgh Airport (EDI Aircraft noise events – 85 Departures) the mobile noise monitor recorded:

- Non-EDI aircraft noise – two events
- Traffic, birds or other noise events not associated with air traffic – 27,505 events

The above noise recordings were discounted from the analysis of the results below.

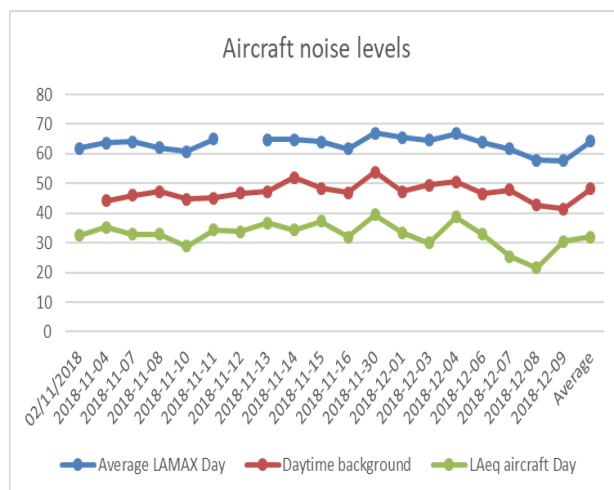
Table 1
Aircraft type SF34

Information will not show for incomplete days for ambient and background noise levels, as this data requires the full day measurement period for the system to carry out its calculations. On days when the monitor is installed, batteries taken away for charging or the equipment is removed from site, a full day of measurements will not be available. Additionally, information will only show for the time of day if an aircraft of this type flew over the noise monitor location during that period of the day.

SF34	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	L _{Aeq} aircraft Day	L _{Aeq} aircraft Night	Average L _{AMAX} Day	Average L _{AMAX} Night	Average SEL Day	Average SEL Night
02/11/2018					32.5		61.9		74.1	
2018-11-04	54.8	47.2	44.2	38.2	35.2		63.6		76.8	
2018-11-07	55.6	47.9	46	35.7	32.8		64		75.6	
2018-11-08	56.3	49.7	47.2	35.8	32.9	28.5	62.1	61.4	74.5	73.1
2018-11-10	54.7	47.2	44.8	37.6	28.9	25.4	60.7	61	76.5	70
2018-11-11	56.9	47.2	45.1	40.9	34.4		64.9		75.9	
2018-11-12	56.8	50.6	46.7	40.5	33.8		65.1		75.4	
2018-11-13	57.4	50.4	47.3	39	36.8	28.4	64.7	62.3	76.6	73
2018-11-14	59.1	51.2	52	39.4	34.3		64.7		75.9	
2018-11-15	58.2	53.6	48.4	44.9	37.3		64		76.4	
2018-11-16	57.8	51.1	46.9	41.3	31.9	30.2	61.6	62.9	74.7	74.8
2018-11-30	60.8	55.2	53.9	50.5	39.5		67		80.1	
2018-12-01	57.1	52.9	47.2	48.2	33.4	29	65.5	60.5	78	73.6
2018-12-03	59.4	53.4	49.5	47.7	30	30.6	64.6	62.9	77.6	75.2
2018-12-04	59.8	52.7	50.5	44	38.7		66.7		80.3	
2018-12-06	59.2	52.3	46.5	44.7	32.9	29.5	63.8	63.2	75.7	74.1
2018-12-07	54.6	48.1	47.8	41.2	25.5		61.7		73.1	
2018-12-08	52	49.4	42.8	43.7	21.6		57.9		69.2	
2018-12-09	51.8	44.6	41.5	39	30.5		57.7		71.1	
Average	57.3	50.9	48.2	43.2	32	22.3	64.2	62.1	76.6	73.7

The graphs below detail the average L_{max}, L₉₀ and L_{Aeq} measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

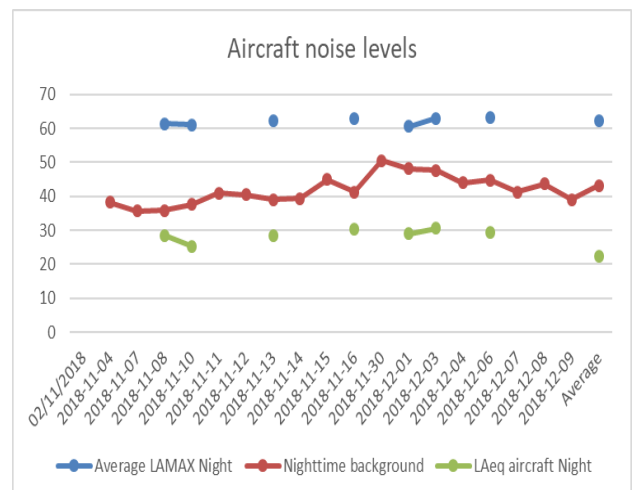
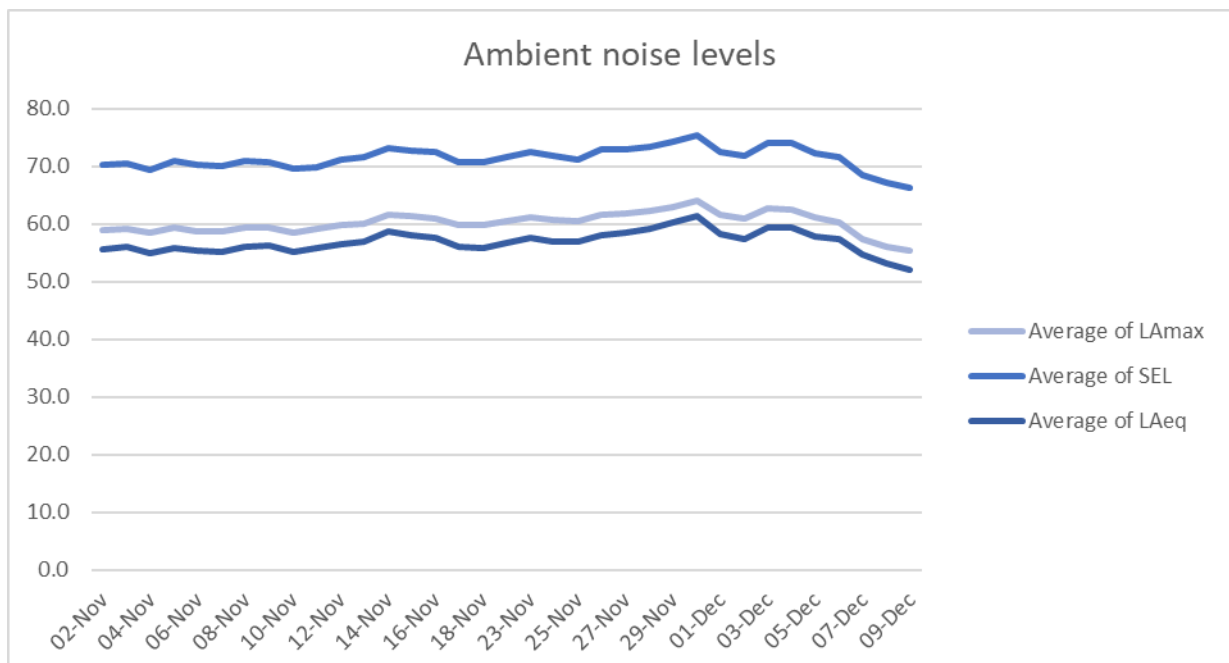


Table 2 Ambient noise levels

The table and graph below provide the levels of noise for Lmax, SEL, and LAeq, the term ambient refers to the levels of noise when aircraft noise is not present. The noise levels shown are averages for the full 24-hour period per day and provide an overview of the other noise sources and the general noise climate in this location.

Date	Average of L _{Amax}	Average of SEL	Average of L _{Aeq}	Date	Average of L _{Amax}	Average of SEL	Average of L _{Aeq}
02-Nov	58.9	70.4	55.6	23-Nov	61.2	72.5	57.5
03-Nov	59.1	70.4	56.0	24-Nov	60.7	71.8	57.0
04-Nov	58.4	69.3	55.0	25-Nov	60.5	71.3	56.9
05-Nov	59.5	70.9	55.8	26-Nov	61.6	72.9	58.2
06-Nov	58.8	70.2	55.5	27-Nov	61.8	73.0	58.6
07-Nov	58.7	70.0	55.2	28-Nov	62.3	73.5	59.2
08-Nov	59.4	70.9	56.1	29-Nov	62.9	74.2	60.2
09-Nov	59.4	70.7	56.2	30-Nov	64.0	75.4	61.3
10-Nov	58.5	69.6	55.1	01-Dec	61.5	72.5	58.3
11-Nov	59.1	69.9	55.8	02-Dec	60.9	71.9	57.5
12-Nov	59.8	71.2	56.6	03-Dec	62.7	74.1	59.5
13-Nov	60.2	71.5	56.9	04-Dec	62.6	74.0	59.3
14-Nov	61.7	73.1	58.7	05-Dec	61.2	72.3	57.8
15-Nov	61.4	72.8	58.2	06-Dec	60.4	71.7	57.5
16-Nov	61.0	72.5	57.6	07-Dec	57.3	68.6	54.6
17-Nov	59.8	70.7	56.1	08-Dec	56.1	67.2	53.1
18-Nov	59.9	70.8	56.0	09-Dec	55.4	66.4	52.0
19-Nov	60.4	71.6	56.8				
Average	60.2	71.4	56.8	Average	60.2	71.4	56.8



6.2 Location 2 Aircraft Type SF34 LA90, LAeq, SEL, Lnight

Between 02/11/2018 and 09/12/2018 there were 6,125 departures from Runway 24 during this period. Of this total number of departures, 258 departed via the GRICE3C SID. This location is only occasionally directly overflown by aircraft on a GRICE3C SID or by aircraft vectored off SID by ATC.

The runway split during this period was R24 56% / R06 44 % see Appendix C for table of runway usage.

The most frequent aircraft recorded during this period were SAAB 340 (SF34), 147 of this type of aircraft flew on this flight path during this time period, of those which flew within the vicinity of this location and were recorded by the monitoring equipment 38 were of this aircraft type. The average duration of each recording was 20 seconds.

The noise monitoring equipment also recorded data from six B738, two BE20 a small light aircraft, two A319, and one each of six other aircraft types. Data on those flights will not be analysed for this location as the sample size is not sufficient.

- The loudest aircraft was on average the SF34 Turboprop
- During this period the mobile noise monitor recorded a total of 58 aircraft noise events, 54 of these were aircraft noise events associated with operations at EDI. This was comprised of 54 departures from Runway 24.

Location details

The noise monitor was located in the garden area of the property. The noise monitor was located to the side of the property, in an area surrounded by wood land and next to a golf course.

The location has minimal background noise generated by road traffic from the A899 and A89, in addition to birdsong.

The noise monitor was located in a grassed area with no reflection from roofs or other hard surfaces.

In addition to recording noise events from aircraft movements to or from Edinburgh Airport, the mobile noise monitor recorded:

- Non-EDI aircraft noise – four events
- Traffic, birds or other noise events not associated with air traffic – 3561 events

The above noise recordings were discounted from the analysis of the results below.

Table 3

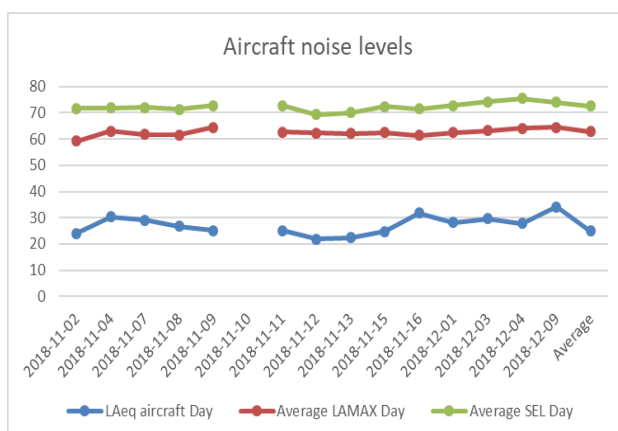
Aircraft Type SF34

Information will not show for ambient and background noise levels for incomplete days, as this data requires the full day measurement period for the system to carry out its calculations. On days when the monitor is installed, batteries taken away for charging or the equipment is removed from site, a full day of measurements will not be available. Additionally, information will only show for the time of day if an aircraft of this type flew over the noise monitor location during that period of the day.

SF34	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAMAX Day	Average LAMAX Night	Average SEL Day	Average SEL Night
2018-11-02					24.1	N/A	59.3	N/A	71.7	N/A
2018-11-04	54.8	50.2	50.5	45.2	30.3	N/A	63	N/A	71.9	N/A
2018-11-07	54.9	48.9	51.4	43	29.1	25.7	61.8	59.5	72	70.3
2018-11-08	55.8	51.5	53.4	45.6	26.7	N/A	61.6	N/A	71.3	N/A
2018-11-09	57.7	51.1	53.8	44.3	25.1	24.5	64.4	58.4	72.7	69.1
2018-11-10	54.7	49.9	49.9	45.7		23.4	N/A	58.1		68
2018-11-11	55.3	48	52	43.2	25.1	N/A	62.6	N/A	72.7	N/A
2018-11-12	56.5	51.8	52.7	45.8	21.8	N/A	62.3	N/A	69.4	N/A
2018-11-13	55.5	50.5	52.4	45.4	22.4	19.4	62.2	55.5	70	64
2018-11-15	57.2	52.8	52.1	47.9	24.8	N/A	62.4	N/A	72.4	N/A
2018-11-16	55.7	51.4	49.6	45.7	31.8	23.9	61.4	57.7	71.6	68.5
2018-12-01	53.4	50.3	44.1	44.3	28.2	N/A	62.4	N/A	72.8	N/A
2018-12-03	54.7	50.2	49.6	44.5	29.7	17.3	63.2	54.1	74.3	61.9
2018-12-04	56.4	51.7	53.2	44.7	27.8	N/A	64.2	N/A	75.4	N/A
2018-12-09	53.3	46.7	48.6	39	34.2	N/A	64.5	N/A	74	N/A
Average	55.7	50.9	51.8	45.3	24.9	15.8	62.8	57.6	72.6	67.8

The graphs below detail the average Lmax, L90 and LAeq measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

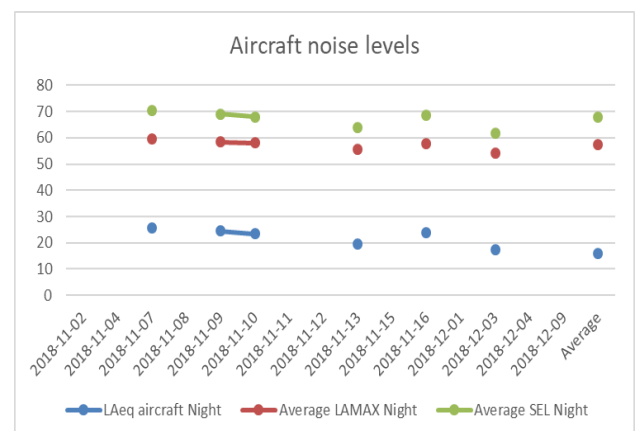
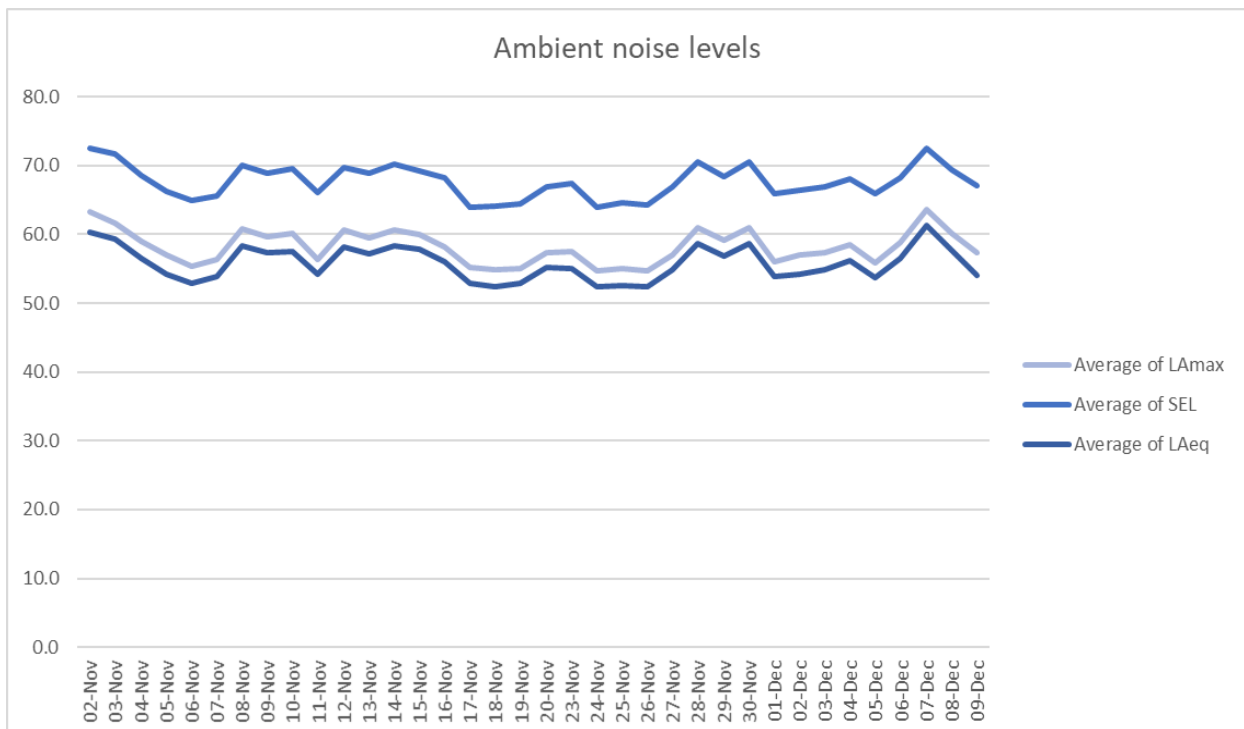


Table 4 Ambient noise levels

The table and graph below provide the levels of noise for Lmax, SEL, and LAeq, the term ambient refers to the levels of noise when aircraft noise is not present. The noise levels shown are averages for the full 24-hour period per day and provide an overview of the other noise sources and the general noise climate in this location.

Date	Average of L _{Amax}	Average of SEL	Average of L _{Aeq}	Date	Average of L _{Amax}	Average of SEL	Average of L _{Aeq}
02-Nov	63.3	72.5	60.3	20-Nov	57.4	66.9	55.2
03-Nov	61.7	71.8	59.4	23-Nov	57.6	67.5	55.1
04-Nov	59.0	68.5	56.5	24-Nov	54.7	64.0	52.3
05-Nov	57.1	66.3	54.2	25-Nov	55.0	64.6	52.5
06-Nov	55.4	64.9	52.9	26-Nov	54.8	64.3	52.4
07-Nov	56.3	65.6	53.8	27-Nov	57.0	66.9	54.8
08-Nov	60.8	70.1	58.4	28-Nov	60.9	70.5	58.7
09-Nov	59.7	68.9	57.4	29-Nov	59.2	68.4	56.8
10-Nov	60.2	69.6	57.5	30-Nov	61.0	70.5	58.7
11-Nov	56.4	66.0	54.2	01-Dec	56.0	65.9	53.8
12-Nov	60.6	69.7	58.1	02-Dec	56.9	66.4	54.2
13-Nov	59.5	68.8	57.2	03-Dec	57.4	66.9	54.9
14-Nov	60.6	70.2	58.4	04-Dec	58.5	68.0	56.2
15-Nov	60.0	69.2	57.8	05-Dec	55.9	65.8	53.7
16-Nov	58.2	68.3	56.0	06-Dec	58.8	68.3	56.5
17-Nov	55.2	64.0	52.9	07-Dec	63.5	72.5	61.3
18-Nov	54.9	64.0	52.4	08-Dec	60.2	69.4	57.7
19-Nov	55.1	64.5	52.9	09-Dec	57.3	67.1	54.1
Average	58.4	67.8	56.0	Average	58.4	67.8	56.0



6.3 Location 3 Aircraft Type SF34, A319 & B738, LA90, LAeq, SEL, Lnight

Between 02/11/2018 and 09/12/2018 there were 6,125 departures from Runway 24 during this period, from Edinburgh Airport. Of this total number of departures, 258 departed via the GRICE3C SID. This location may also experience noise from aircraft flying in the vicinity on the 24TALLA, 24GOSAM SIDs

The runway split during this period was R24 56% / R06 44% see Appendix C for table of runway usage.

The most frequent aircraft recorded during this period were Boeing 737-800 (B738) jet aircraft, and Bombardier Dash 8, of those which overflowed this location and were recorded by the monitoring equipment, there were 696 B738, 463 A320s and 426 A319s, this area was also over flown by 42 other aircraft types.

The loudest aircraft recorded by the noise monitoring equipment at this location was on average the A319, as the most frequent aircraft was the B737-800 both aircraft will be analysed for this location.

During this period the mobile noise monitor recorded a total of

- 2,508 aircraft noise events,
- 2,500 of these were aircraft noise events associated with operations at EDI.
- This was composed of 2,041 departures, and 459 arrivals to Runway 24.

Location details

The noise monitor was located to the side and rear of the property, this property is located in the town of Uphall, however the property sits close to the A89, this is a busy road which can become congested during rush hour.

Background noise was mainly generated by road noise, birdsong, children playing, and the normal daily activities associated with a town

The noise monitor was located in a grassed area with no reflection from roofs or other hard surfaces.

In addition to recording noise events from aircraft movements to or from Edinburgh Airport the mobile noise monitor recorded:

- Non-EDI aircraft noise – eight events
- Traffic, birds or other noise events not associated with air traffic – 1,090

The above noise recordings were discounted from the analysis of the results below.

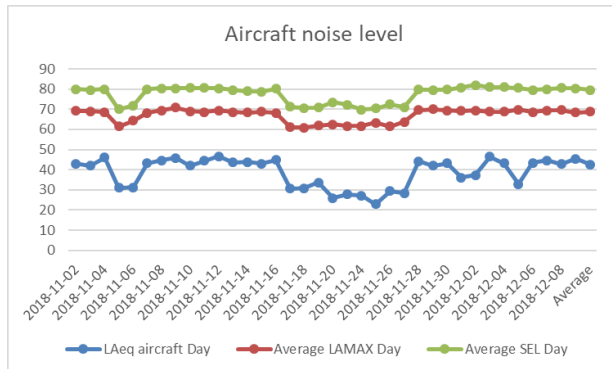
Table 5 Analysis Aircraft Type A319

Information will not show for ambient and background noise levels for incomplete days, as this data requires the full day measurement period for the system to carry out its calculations. On days when the monitor is installed, batteries taken away for charging or the equipment is removed from site, a full day of measurements will not be available. Additionally, information will only show for the time of day if an aircraft of this type flew over the noise monitor location during that period of the day.

A319	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAMAX Day	Average LAMAX Night	Average SEL Day	Average SEL Night
2018-11-02					43.1		69.3		80	
2018-11-03	59.2	58.9	53.2	52	42	39.4	69.1	70.9	79.6	81
2018-11-04	57.7	56.3	53.1	51.3	46		68.6		79.9	
2018-11-05	57.2	54.5	52.9	49.3	31		61.4		70.1	
2018-11-06	55.4	52.5	52.5	49.8	31.3		64.3		71.9	
2018-11-07	56.3	52.3	53.2	48.7	43.2		68.2		80	
2018-11-08	58.1	54.7	54.3	49.5	44.7	39.3	69.5	67.7	80.3	77.8
2018-11-09	58.2	55.3	54.2	51.2	45.9	39.4	70.9	72	80.4	81
2018-11-10	62.2	62.1	54.6	54	41.9	39.4	69	68.8	80.5	81
2018-11-11	58	55	55.2	53	44.5		68.6		80.6	
2018-11-12	58.5	55.5	54.7	51.9	46.7	39.3	69.4	69.6	80.4	80.9
2018-11-13	57.7	54.8	53.8	51.5	43.7	42.5	68.6	68.1	79.5	80.1
2018-11-14	60.9	56	57.1	50.5	43.9	39.3	68.4	68.7	78.9	79.1
2018-11-15	58.4	57	54.5	53.1	43	38	68.8	69.8	78.8	79.6
2018-11-16	58.8	55.3	53.7	50.6	44.8	39.5	68.2	67.5	80.1	79.3
2018-11-17	55.5	52.1	53.4	49.8	30.6		61.1		71.3	
2018-11-18	55.7	52.1	53.3	49.9	30.9		60.8		70.7	
2018-11-19	55.9	52.5	53.2	49.3	33.7		61.9		70.9	
2018-11-20					25.9		62.6		73.5	
2018-11-23					27.7		61.6		72.3	
2018-11-24	56.4	54.7	53.6	51.3	27.1		61.6		69.9	
2018-11-25	57.4	56.5	55.7	54	22.9	25.2	63.4	60.7	70.5	69.8
2018-11-26	57.3	55.3	54.5	53.1	29.5		61.4		72.4	
2018-11-27	57.1	54.9	54.3	52.4	28.3		63.7		71.1	
2018-11-28	61.1	54.9	55.7	51.2	44.2		69.6		79.7	
2018-11-29	62.3	58.2	59.5	56.4	41.9	37.7	70	71.7	79.5	82.3
2018-11-30	62.6	61.4	60.6	59.4	43.3		69.5		79.7	
2018-12-01	59.5	59.5	57.2	57.1	36.2	37.5	69.3	69.4	80.8	82.1
2018-12-02	58.8	57.1	56.2	55.9	37.3		69.5		81.9	
2018-12-03	60	59.5	57.4	57.4	46.5	40.5	68.7	70.8	80.9	82.1
2018-12-04	59.7	57.8	57.3	55.7	43.3	42.3	68.9	68.4	80.9	80.8
2018-12-05	59.7	57.1	57.9	54.6	32.9	36.6	69.9	69.8	80.5	81.2
2018-12-06	60.2	58	57.1	56.2	43.4		68.6		79.6	
2018-12-07	62.5	59.3	59.9	55.7	44.6	40.2	69.4	68.3	79.9	80
2018-12-08	60	60	57.8	57.9	42.8	38.8	69.6	68.7	80.5	80.4
2018-12-09	58.7	56.7	56	55.7	45.4		68.4		80.4	
Average	59.2	57.1	56	54	42.7	36.5	68.7	69.1	79.6	80.3

The graphs below detail the average Lmax, L90 and LAeq measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

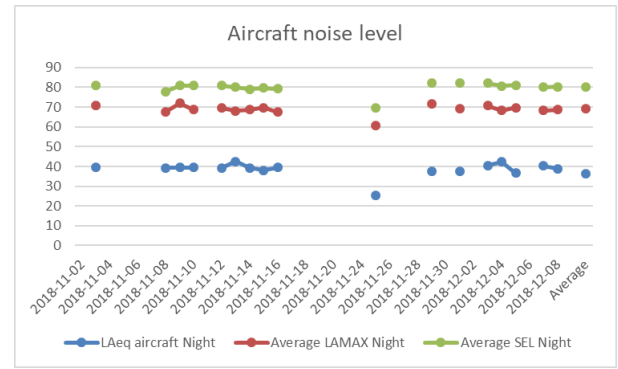
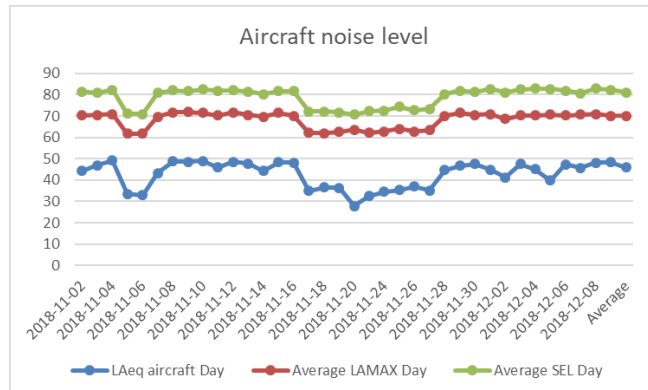


Table 6 Analysis Aircraft Type B738

B738	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAMAX Day	Average LAMAX Night	Average SEL Day	Average SEL Night
2018-11-02					44.3		70.2		81.5	
2018-11-03	59.2	58.9	53.2	52	47	40.8	70.6	71.3	80.8	80.6
2018-11-04	57.7	56.3	53.1	51.3	49.2	45.7	71	70.8	82.2	82.5
2018-11-05	57.2	54.5	52.9	49.3	33.6	28.4	61.8	60.9	71.2	73
2018-11-06	55.4	52.5	52.5	49.8	33	29.9	61.7	61	71	71.5
2018-11-07	56.3	52.3	53.2	48.7	43.3		69.6		80.9	
2018-11-08	58.1	54.7	54.3	49.5	48.7	43.1	71.7	70.6	82.1	81.6
2018-11-09	58.2	55.3	54.2	51.2	48.6	44.7	71.9	73.3	81.6	82.3
2018-11-10	62.2	62.1	54.6	54	48.9	44.1	71.6	70.6	82.5	82.7
2018-11-11	58	55	55.2	53	46	33.3	70.2	68.7	81.9	77.9
2018-11-12	58.5	55.5	54.7	51.9	48.6	45.5	71.7	71.6	82.1	82.3
2018-11-13	57.7	54.8	53.8	51.5	47.7	42.2	70.5	70.7	81.5	80.7
2018-11-14	60.9	56	57.1	50.5	44.3	43.1	69.7	69	80.2	80.7
2018-11-15	58.4	57	54.5	53.1	48.3	41.1	71.5	71.8	81.6	82.7
2018-11-16	58.8	55.3	53.7	50.6	48.1	44.6	70	68.4	81.7	80.2
2018-11-17	55.5	52.1	53.4	49.8	35	33.7	62.2	61.7	72.2	71.3
2018-11-18	55.7	52.1	53.3	49.9	36.6	30.7	62	60.5	72.2	72.3
2018-11-19	55.9	52.5	53.2	49.3	36.3	30	62.5	62.6	71.8	74.6
2018-11-20					27.9		63.5		70.7	
2018-11-23					32.6	31	62.1	61.1	72.4	72.6
2018-11-24	56.4	54.7	53.6	51.3	34.6	32.5	62.8	60.8	72.6	72.3
2018-11-25	57.4	56.5	55.7	54	35.3	24.4	64.1	61.4	74.4	69
2018-11-26	57.3	55.3	54.5	53.1	37	31.5	62.7	61	72.8	73.1
2018-11-27	57.1	54.9	54.3	52.4	35.2	29.2	63.4	62.1	73.3	70.8
2018-11-28	61.1	54.9	55.7	51.2	44.7		70		80.3	
2018-11-29	62.3	58.2	59.5	56.4	46.7	44.8	71.6	71.9	81.8	83.4
2018-11-30	62.6	61.4	60.6	59.4	47.5	39.8	70.6	70.7	81.3	81.4
2018-12-01	59.5	59.5	57.2	57.1	45	43.9	70.9	70	82.6	82.5
2018-12-02	58.8	57.1	56.2	55.9	41.2		68.7		81	
2018-12-03	60	59.5	57.4	57.4	47.6	46.2	70.3	70.8	82.4	83
2018-12-04	59.7	57.8	57.3	55.7	45.2	37	70.3	69.2	82.8	81.6
2018-12-05	59.7	57.1	57.9	54.6	39.8	43	70.8	70	82.6	82.8
2018-12-06	60.2	58	57.1	56.2	47.3	42.3	70.3	69.9	81.9	80.9
2018-12-07	62.5	59.3	59.9	55.7	45.8	43.2	70.8	70.8	80.6	80.8
2018-12-08	60	60	57.8	57.9	48.2	44.2	71	70.9	82.8	80.3
2018-12-09	58.7	56.7	56	55.7	48.3	44.9	70.1	71.2	82.3	82.5
Average	59.2	57.1	56	54	45.9	41.6	70.1	70	81	81

The graphs below detail the average Lmax, L90 and LAeq measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

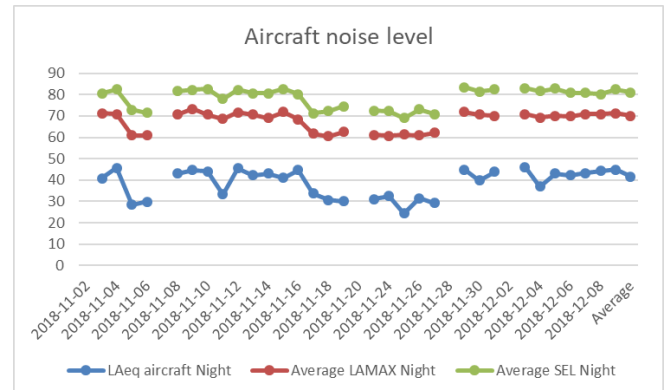
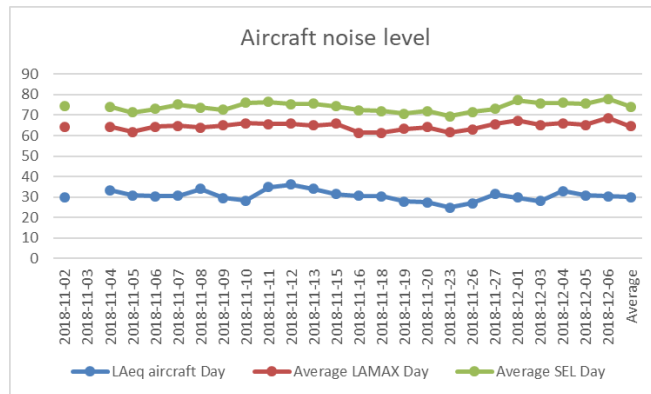


Table 7 Analysis Aircraft Type SF34

SF34	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAMAX Day	Average LAMAX Night	Average SEL Day	Average SEL Night
2018-11-02					30		64.3		74.6	
2018-11-03	59.2	58.9	53.2	52		26.6		61.9		71.2
2018-11-04	57.7	56.3	53.1	51.3	33.4		64.4		74	
2018-11-05	57.2	54.5	52.9	49.3	30.8	26.3	61.8	61.4	71.4	70.9
2018-11-06	55.4	52.5	52.5	49.8	30.3	25.8	64.4	61.8	73.1	70.4
2018-11-07	56.3	52.3	53.2	48.7	30.5		64.8		75.1	
2018-11-08	58.1	54.7	54.3	49.5	33.9	29.7	63.8	61.6	73.7	71.3
2018-11-09	58.2	55.3	54.2	51.2	29.6	24.8	64.9	61.7	72.5	69.4
2018-11-10	62.2	62.1	54.6	54	28.3		66		75.9	
2018-11-11	58	55	55.2	53	34.9		65.7		76.5	
2018-11-12	58.5	55.5	54.7	51.9	36.1		65.9		75.3	
2018-11-13	57.7	54.8	53.8	51.5	34	29.9	65	64.8	75.6	74.5
2018-11-15	58.4	57	54.5	53.1	31.4		65.9		74.3	
2018-11-16	58.8	55.3	53.7	50.6	30.7	27.4	61.3	59.4	72.3	72
2018-11-18	55.7	52.1	53.3	49.9	30.4		61.4		72	
2018-11-19	55.9	52.5	53.2	49.3	27.9		63.3		70.7	
2018-11-20					27.4		64.2		72	
2018-11-23					24.8	29	61.5	61.1	69.4	73.6
2018-11-26	57.3	55.3	54.5	53.1	26.9	29.3	63	63.3	71.5	73.9
2018-11-27	57.1	54.9	54.3	52.4	31.5	30.9	65.6	63.2	73.1	72.5
2018-12-01	59.5	59.5	57.2	57.1	29.7		67.4		77.3	
2018-12-03	60	59.5	57.4	57.4	28.1		65.2		75.7	
2018-12-04	59.7	57.8	57.3	55.7	33		66.1		75.9	
2018-12-05	59.7	57.1	57.9	54.6	30.9		65.1		75.5	
2018-12-06	60.2	58	57.1	56.2	30.3		68.5		77.9	
Average	59.2	57.1	56	54	30	23.2	64.6	62.3	74.1	72.2

The graphs below detail the average Lmax, L90 and LAeq measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

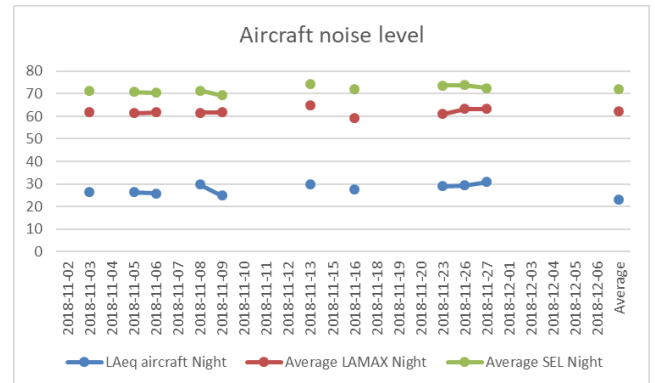
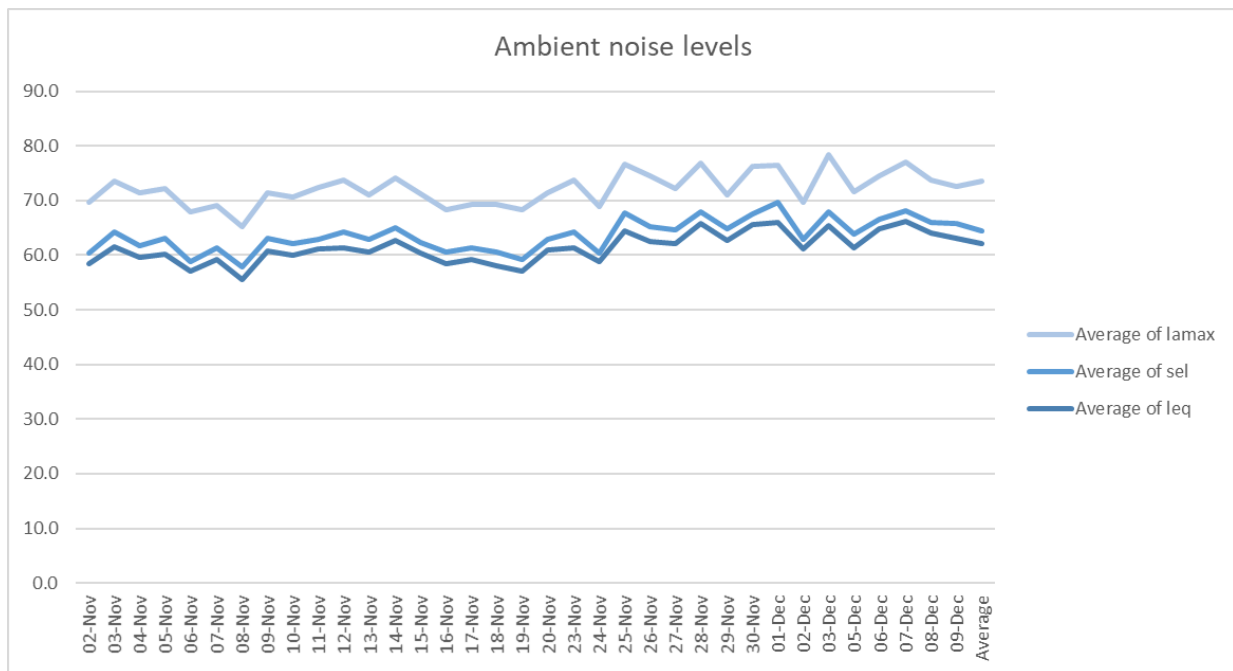


Table 8 Ambient noise levels

The table and graph below provide the levels of noise for Lmax, SEL, and LAeq, the term ambient refers to the levels of noise when aircraft noise is not present. The noise levels shown are averages for the full 24-hour period per day and provide an overview of the other noise sources and the general noise climate in this location.

Date	Average of SEL	Average of LAMax	Average of LAeq	Date	Average of SEL	Average of LAMax	Average of LAeq
02-Nov	69.8	60.4	58.4	20-Nov	71.4	62.9	61.0
03-Nov	73.6	64.2	61.6	23-Nov	73.7	64.3	61.4
04-Nov	71.3	61.7	59.6	24-Nov	68.8	60.5	58.7
05-Nov	72.2	63.1	60.2	25-Nov	76.7	67.7	64.5
06-Nov	68.0	58.8	57.1	26-Nov	74.6	65.3	62.5
07-Nov	69.1	61.3	59.2	27-Nov	72.1	64.7	62.1
08-Nov	65.1	57.9	55.6	28-Nov	76.8	67.8	65.8
09-Nov	71.5	63.0	60.7	29-Nov	71.1	64.9	62.6
10-Nov	70.7	62.1	60.0	30-Nov	76.2	67.5	65.7
11-Nov	72.5	62.9	61.2	01-Dec	76.4	69.6	66.0
12-Nov	73.7	64.2	61.3	02-Dec	69.6	62.9	61.1
13-Nov	71.1	63.0	60.7	03-Dec	78.5	67.9	65.4
14-Nov	74.2	65.0	62.7	05-Dec	71.6	63.9	61.4
15-Nov	71.2	62.3	60.3	06-Dec	74.5	66.6	64.8
16-Nov	68.2	60.5	58.4	07-Dec	77.1	68.2	66.1
17-Nov	69.4	61.4	59.1	08-Dec	73.8	66.1	64.1
18-Nov	69.4	60.5	58.1	09-Dec	72.5	65.8	63.0
19-Nov	68.2	59.2	57.1	Average	73.5	64.4	62.2



6.4 Location 4 Aircraft Type SF34 LA90, LAeq, SEL, Night

Between 21/02/19 and 08/03/19 there were 4,466 arrivals / departures from Runway 24 during this period. Of this total, the number of departures via the GRICE3C SID were 159. This location is occasionally directly overflown by aircraft on a GRICE3C SID or by aircraft vectored off SID by ATC.

The runway split during this period was R24 86% / R06 14 % see Appendix C for table of runway usage.

This location is overflown infrequently, and noise monitoring in this location, as expected, provided few aircraft noise associated readings. However, carrying out monitoring at this location still provided useful background noise data, providing information on the noise associated with normal everyday activities with in this area.

The most frequent aircraft recorded during this period were SAAB 340 (SF34), 91 of this type of aircraft flew on this flight path during this time period, of those which flew within the vicinity of this location and were recorded by the monitoring equipment seven were of this aircraft type. The average duration of each recording was 20 seconds.

The loudest and most frequent aircraft recorded by the noise monitoring equipment at this location during this period was on average the SF34, as the most frequent aircraft this aircraft will be analysed for this location. Only one further aircraft was recorded at this location, this was a B737-800.

During this period the mobile noise monitor recorded a total of 8 Aircraft noise events, 7 of these were aircraft noise events associated with operations at EDI. This was composed of seven Departures from runway 24.

Location details

The noise monitor was placed in the rear garden area of this property, this location was within a residential street, and the A899 a busy main road through the town of Uphall. This location is

infrequently overflowed by either turbo prop aircraft on a GRICE3C SID or by aircraft that have been diverted of track for weather or other operational reasons.

This location was within the town of Uphall, located towards the edge of the main town area, with background noise generated by various sources including road noise, birdsong and wind. The noise monitor was located in a grassed area with no reflection from roofs or other hard surfaces.

In addition to recording noise events from aircraft movements to or from Edinburgh Airport the mobile noise monitor recorded:

- Non-EDI aircraft noise – 0 events
- Traffic, birds or other noise events not associated with air traffic – 2,546

The above noise recordings were discounted from the analysis of the results below.

Table 9

SF34

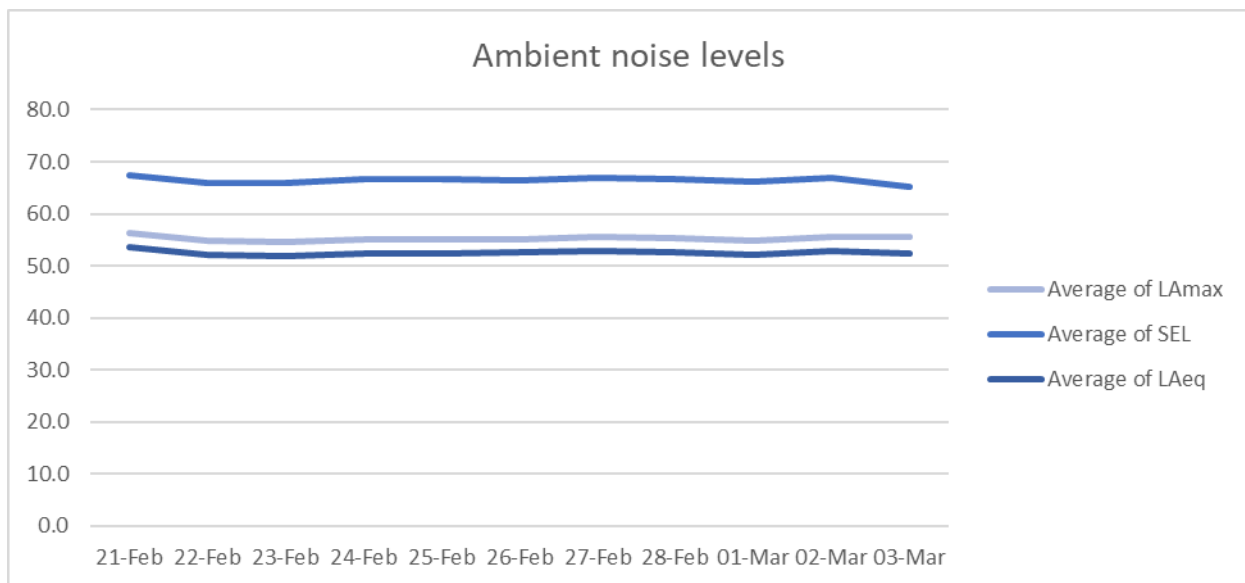
Information will not show for ambient and background noise levels for incomplete days, as this data requires the full day measurement period for the system to carry out its calculations. On days when the monitor is installed, batteries taken away for charging or the equipment is removed from site, a full day of measurements will not be available. Additionally, information will only show for the time of day if an aircraft of this type flew over the noise monitor location during that period of the day.

SF34	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAMAX Day	Average LAMAX Night	Average SEL Day	Average SEL Night
2019-02-24	52.5	47.1	47	41.6	19.9		57.4		67.5	
2019-02-26	52.9	47.8	47.8	42	23.2		55.3		70.8	
2019-02-27	53.2	49.3	48.3	42.8		20.2		52.9		64.8
2019-03-01	53.1	47.4	47.9	40.5	25.1		59.2		69.7	
Average	53.3	48.1	48	41.3	18.4	10.2	58	52.9	69.6	64.8

Table 10 Ambient noise levels

The table and graph below provide the levels of noise for Lmax, SEL, and LAeq, the term ambient refers to the levels of noise when aircraft noise is not present. The noise levels shown are averages for the full 24-hour period per day and provide an overview of the other noise sources and the general noise climate in this location.

Date	Average of L _{Amax}	Average of SEL	Average of L _{Aeq}
21-Feb	56.4	67.3	53.6
22-Feb	54.9	66.0	52.2
23-Feb	54.7	66.0	52.0
24-Feb	55.1	66.7	52.4
25-Feb	55.1	66.6	52.4
26-Feb	55.2	66.5	52.5
27-Feb	55.5	66.9	52.9
28-Feb	55.3	66.7	52.6
01-Mar	54.9	66.1	52.2
02-Mar	55.6	66.8	52.8
03-Mar	55.6	65.1	52.5
Average	55.2	66.5	52.5



6.5 Location 5 Aircraft Type SF34 LA90, LAeq, SEL, Night

Between 21/02/19 and 08/03/19 there were 4,466 arrivals / departures from Runway 24 during this period. Of this total, the number of departures via the GRICE3C SID were 159. This location is only occasionally directly overflown by aircraft on a GRICE3C SID or by aircraft vectored off SID by ATC or by aircraft carrying out a 'go-around' procedure.

There are occasions when it is impossible for an inbound aircraft to land. In such circumstances it has to carry out a procedure known as a 'go-around'. We are sure you will appreciate that safety must have priority and a 'go-around' is a safety manoeuvre.

The runway split during this period was R24 86% / R06 14 % see Appendix C for table of runway usage.

This location is overflown infrequently, and noise monitoring in this location as expected provided very few aircraft noise associated readings. However, carrying out monitoring at this location still provided useful background noise data provided information on the noise associated with normal everyday activities with in this location.

Due to the minimal aircraft noise events captured at this location a meaningful analysis of trends is not possible. However, during the monitoring period 3,778 readings of back ground levels were obtained by the noise monitor and a data table of this information is provided overleaf.

During this period the mobile noise monitor recorded a total of

- 16 Aircraft noise events,
- three of these were aircraft noise events associated with operations at EDI. This was composed of one 'go-around', one Departure via R06, and 1 Arrival to runway 24 of a police helicopter.

Location details

The noise monitor was located in the garden area of the property. This garden area was surrounded by other properties, though not at a distance which would cause reverberation of sound. This location was within the village of Kirkliston, with some background noise generated by local roads, children and normal daily activities.

The noise monitor was located in a grassed area with no reflection from roofs or other hard surfaces.

In addition to recording noise events from aircraft movements to or from Edinburgh Airport the mobile noise monitor recorded:

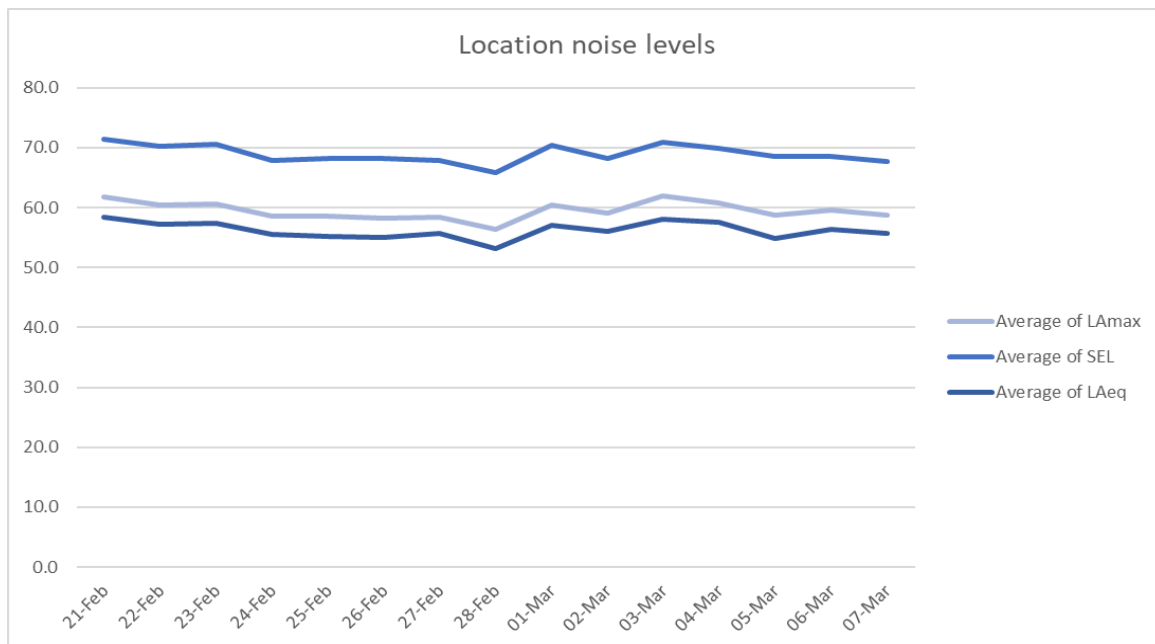
- Non-EDI aircraft noise – no events
- Traffic, Birds or other noise events not associated with air traffic – 3,778

The above noise recordings were discounted from the analysis of the results below.

Table 11 Ambient noise levels

The table and graph below provide the levels of noise for Lmax, SEL, and LAeq, the term ambient refers to the levels of noise when aircraft noise is not present. The noise levels shown are averages for the full 24-hour period per day and provide an overview of the other noise sources and the general noise climate in this location.

Date	Average of L _{Amax}	Average of SEL	Average of L _{Aeq}
21-Feb	61.8	71.5	58.4
22-Feb	60.5	70.2	57.2
23-Feb	60.6	70.5	57.4
24-Feb	58.5	68.0	55.5
25-Feb	58.5	68.2	55.1
26-Feb	58.3	68.1	55.0
27-Feb	58.4	67.9	55.7
28-Feb	56.4	65.8	53.1
01-Mar	60.5	70.5	57.1
02-Mar	59.1	68.2	56.1
03-Mar	62.0	70.8	58.1
04-Mar	60.8	69.9	57.6
05-Mar	58.7	68.5	54.9
06-Mar	59.6	68.6	56.4
07-Mar	58.8	67.7	55.7
Average	59.2	68.7	55.9



6.6 Location 6 Aircraft Type A319 and B738 LA90, LAeq, SEL, Lnight

Between 21/02/19 and 08/03/19 there were 4466 Arrivals / Departures from Runway 24 during this period. Of this total, the number of departures via the GRICE3C SID were 159. This location may be overflown by aircraft on a GRICE3C, 24TALLA or 24GOSAM SID.

The Runway split during this period was R24 86% / R06 14 % see Appendix C for table of runway usage.

The most frequent aircraft recorded during this period were Boeing 737-800 (B738) Aircraft, and Bombardier Dash 8, of those which overflowed this location and were recorded by the monitoring equipment there were 696 x B738, 463 x A320 and 426 x A319, this area was also over flown by 42 other aircraft types.

The loudest aircraft was on average was the B738, as this will also be analysed as the most frequent, analysis of the second loudest during this period will be analysed – A319

Due to the location of this Property below our flightpaths the capture of aircraft noise events was very good.

During this period the mobile noise monitor recorded a total of

- 2094 Aircraft noise events,
- 2088 of these were aircraft noise events associated with operations at EDI.
- This was comprised of 1717 Departures, and 371 Arrivals to runway 24.

Location details

The noise monitor was placed in the rear garden area of this property, this location was within a residential street some background noise generated by Road noise, birdsong, children and general daily activities associated with a location within a residential area.

The noise monitor was located in a grassed area with no reflection from roofs or other hard surfaces.

In addition to recording noise events from aircraft movements to or from Edinburgh Airport the mobile noise monitor also recorded:

- Non-EDI aircraft noise – 6 events
- Traffic, Birds or other noise events not associated with air traffic – 3171

The above noise recordings were discounted from the analysis of the results below.

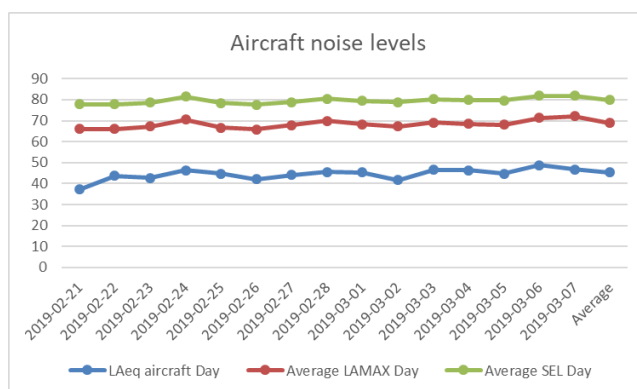
Table 12
A319

Information will not show for ambient and background noise levels for incomplete days, as this data requires the full day measurement period for the system to carry out its calculations. On days when the monitor is installed, batteries taken away for charging or the equipment is removed from site, a full day of measurements will not be available. Additionally, information will only show for the time of day if an aircraft of this type flew over the noise monitor location during that period of the day.

A319	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAMAX Day	Average LAMAX Night	Average SEL Day	Average SEL Night
2019-02-21					37.2		66.1		77.9	
2019-02-22	55.4	47.6	42.4	34.9	43.7	37.2	66.1	67.1	77.9	78.8
2019-02-23	53.3	47.4	43.8	33.8	42.8	36.8	67.2	64.9	78.7	76.6
2019-02-24	54.8	45.7	42.3	34.4	46.3	31.3	70.6	63.4	81.4	75.9
2019-02-25	53.6	48.5	40.9	34.4	44.8	34.6	66.7	66.6	78.4	79.2
2019-02-26	52.9	48.2	41.2	34.8	42	40.1	65.8	66.8	77.6	78.7
2019-02-27	56.2	49.3	43.3	35.2	44.2	39.7	67.8	67.3	78.8	79.5
2019-02-28	55.1	46.3	44	34.8	45.6	35.4	70	69.7	80.4	80
2019-03-01	54.8	49.7	40.7	30.3	45.4	40.9	68.3	67.7	79.4	79.4
2019-03-02	54.7	49	44.9	35.2	41.6	37	67.3	64.9	78.8	76.8
2019-03-03	55.1	53.9	41.1	43.6	46.5	34.2	69.1	68.7	80.3	78.8
2019-03-04	55.4	49.8	45.3	38.9	46.4	36.7	68.4	69	79.8	81.3
2019-03-05	54.2	49	40.8	35.5	44.7	42.7	68.1	69.2	79.6	80.4
2019-03-06	56.6	51.4	44.3	36.6	48.8		71.3		81.8	
2019-03-07	57.2	51.4	45	32.2	46.8	45	72.1	72.7	81.9	82.6
Average	55.1	49.6	43.2	36.7	45.4	39	69	68.7	79.9	79.8

The graphs below detail the average Lmax, L90 and LAeq measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

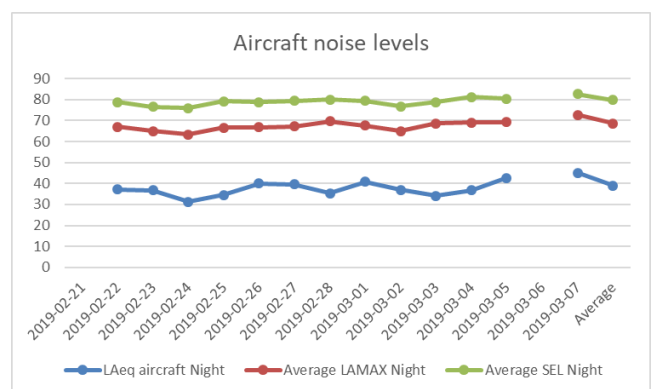
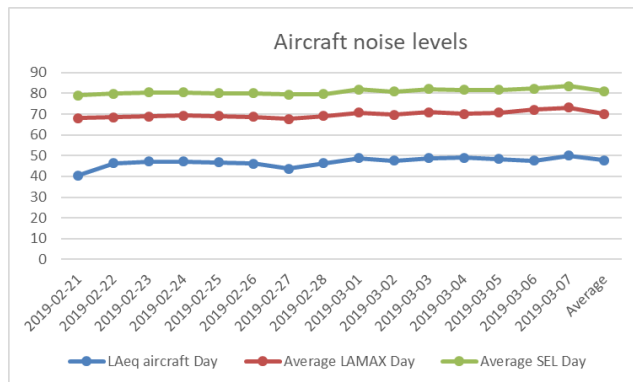


Table 13
B738

B738	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAMAX Day	Average LAMAX Night	Average SEL Day	Average SEL Night
2019-02-21					40.5		68.1		79.1	
2019-02-22	55.4	47.6	42.4	34.9	46.4	43.9	68.4	68.5	79.8	80.7
2019-02-23	53.3	47.4	43.8	33.8	47.1	44.6	69	67.8	80.4	79.7
2019-02-24	54.8	45.7	42.3	34.4	47.2	43.5	69.4	67.9	80.5	79.6
2019-02-25	53.6	48.5	40.9	34.4	46.7	44.7	69.1	68.8	80.1	80.9
2019-02-26	52.9	48.2	41.2	34.8	46.2	41	68.6	68.3	80	80.9
2019-02-27	56.2	49.3	43.3	35.2	43.7	43	67.6	69.3	79.5	81.6
2019-02-28	55.1	46.3	44	34.8	46.3	41.3	69.1	70.5	79.7	79.9
2019-03-01	54.8	49.7	40.7	30.3	48.7	44	70.7	69	81.8	80.8
2019-03-02	54.7	49	44.9	35.2	47.6	43.8	69.7	68.5	80.8	80
2019-03-03	55.1	53.9	41.1	43.6	48.7	43.7	71	68.7	82	80.5
2019-03-04	55.4	49.8	45.3	38.9	49	43.4	70.2	70.1	81.6	82
2019-03-05	54.2	49	40.8	35.5	48.3	40.8	70.7	68.7	81.6	80.6
2019-03-06	56.6	51.4	44.3	36.6	47.6	35.9	72.1	71.8	82.4	80.5
2019-03-07	57.2	51.4	45	32.2	50	45.9	73.2	72.9	83.5	83.5
Average	55.1	49.6	43.2	36.7	47.7	43.3	70.2	69.3	81.1	80.8

The graphs below detail the average Lmax, L90 and LAeq measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

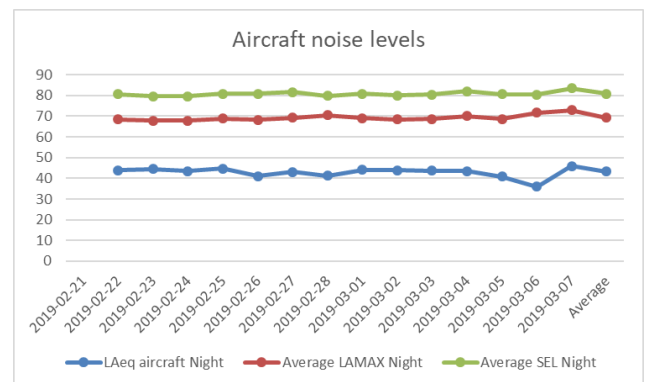
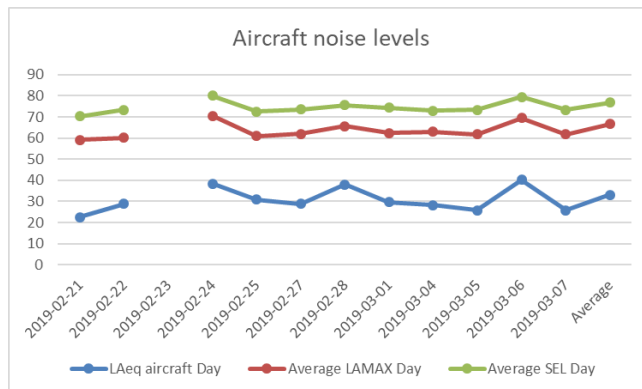


Table 14
SF34

SF34	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAMAX Day	Average LAMAX Night	Average SEL Day	Average SEL Night
2019-02-21					22.6		59.1		70.2	
2019-02-22	55.4	47.6	42.4	34.9	28.8		60.1		73.4	
2019-02-23	53.3	47.4	43.8	33.8		25.6		60.2		70.2
2019-02-24	54.8	45.7	42.3	34.4	38.5		70.4		80	
2019-02-25	53.6	48.5	40.9	34.4	31		61		72.6	
2019-02-27	56.2	49.3	43.3	35.2	28.9		61.9		73.5	
2019-02-28	55.1	46.3	44	34.8	38	28.2	65.6	63	75.6	72.8
2019-03-01	54.8	49.7	40.7	30.3	29.7		62.4		74.3	
2019-03-04	55.4	49.8	45.3	38.9	28.3		62.9		72.9	
2019-03-05	54.2	49	40.8	35.5	25.8		61.7		73.4	
2019-03-06	56.6	51.4	44.3	36.6	40.3		69.5		79.5	
2019-03-07	57.2	51.4	45	32.2	25.8	29.1	61.8	63.4	73.4	73.7
Average	55.1	49.6	43.2	36.7	33.2	21.2	66.6	62.4	76.7	72.5

The graphs below detail the average Lmax, L90 and LAeq measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

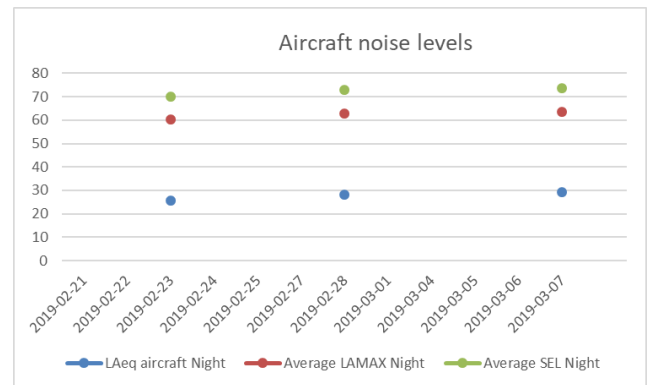
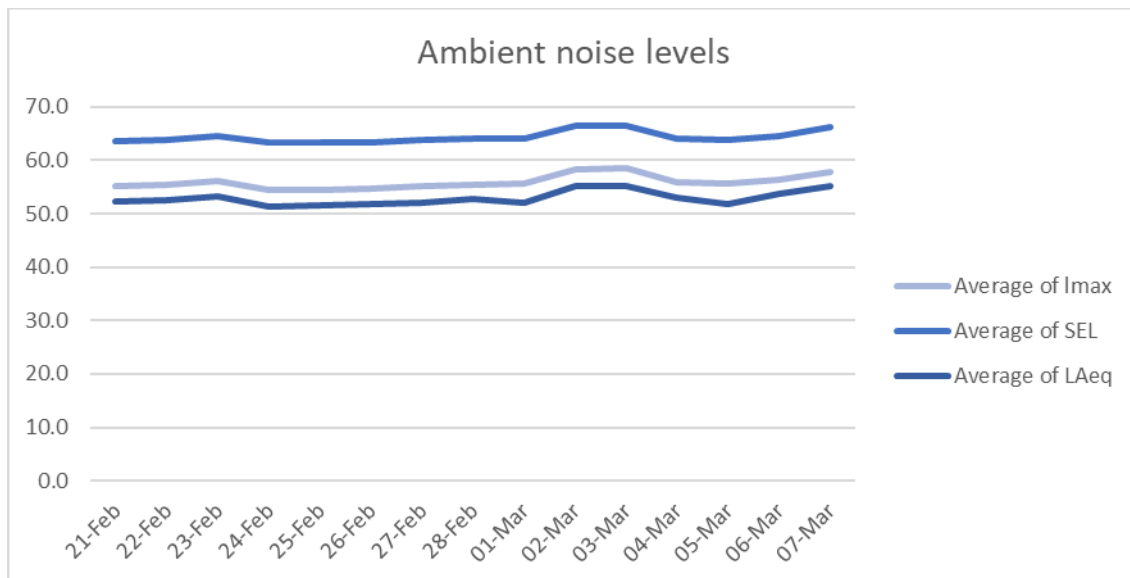


Table 15 Ambient noise levels

The table and graph below provide the levels of noise for Lmax, SEL, and LAeq, the term ambient refers to the levels of noise when aircraft noise is not present. The noise levels shown are averages for the full 24-hour period per day and provide an overview of the other noise sources and the general noise climate in this location.

Date	Average of LMax	Average of SEL	Average of LAeq
21-Feb	55.2	63.5	52.4
22-Feb	55.5	63.9	52.6
23-Feb	56.1	64.5	53.2
24-Feb	54.5	63.3	51.3
25-Feb	54.5	63.3	51.6
26-Feb	54.7	63.4	51.8
27-Feb	55.1	63.9	52.1
28-Feb	55.4	64.0	52.7
01-Mar	55.6	64.0	52.0
02-Mar	58.2	66.4	55.2
03-Mar	58.4	66.4	55.1
04-Mar	55.9	64.1	53.1
05-Mar	55.6	63.8	51.9
06-Mar	56.4	64.7	53.7
07-Mar	57.9	66.3	55.3
Average	56.2	64.6	53.2



6.7 Location 7 Aircraft Type SF34 LA90, LAeq, SEL, Lnight

Between 19/03/2019 and 02/04/2019 there were 2,222 departures from Runway 24 during this period, from Edinburgh Airport. Of this total number of departures 159 departed via the GRICE3C SID. This location is only overflown by aircraft on a GRICE3C SID.

The runway split during this period was R24 88.3% / R06 11.7 % see Appendix C for table of runway usage.

The loudest aircraft and most frequent aircraft recorded at this location during the monitoring period was aircraft type SAAB 340 SF34, of the 49 aircraft noise events captured, 41 of those were of the SF34, two aircraft type BE20 and the remainder were one each of six other aircraft types.

During this period the mobile noise monitor recorded a total of

- 50 Aircraft noise events
- 49 of these were aircraft noise events associated with operations at EDI.
- This was composed of 47 departures via R24, and two arrivals to R06.

Location details

The noise monitor was placed in the rear garden area of this property, this location was within a residential street close to B8046

This location was in a residential area of Uphall, with background noise generated by mainly from road traffic, birdsong and children and general daily activities associated with a location within a residential area. The noise monitor was located in a grassed area with no reflection from roofs or other hard surfaces.

In addition to recording noise events from aircraft movements to or from Edinburgh Airport the mobile noise monitor recorded:

- Non-EDI aircraft noise – one event
- Traffic, Birds or other noise events not associated with air traffic – 5,295

The above noise recordings were discounted from the analysis of the results below.

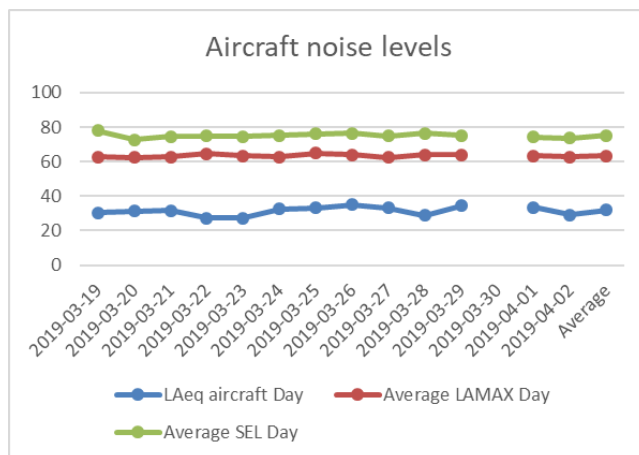
Table 16

Within the table below information will not show for ambient and background noise levels for incomplete days, as this data requires the full day measurement period for the system to carry out its calculations. On days when the monitor is installed, batteries taken away for charging or the equipment is removed from site a full day of measurements will not be available. Additionally, information will only show for the time of day if an aircraft of this type flew over the noise monitor location during that period of the day.

SF34	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	L _{Aeq} aircraft Day	L _{Aeq} aircraft Night	Average L _{AMAX} Day	Average L _{AMAX} Night	Average SEL Day	Average SEL Night
2019-03-19					30.5	N/A	62.6	N/A	78.1	N/A
2019-03-20	55.5	50.7	49.3	41.3	31.2	27.4	62.3	59.1	72.8	69
2019-03-21	55	51.4	48.8	42.8	31.6	N/A	62.7	N/A	74.5	N/A
2019-03-22	56.4	52.1	49.1	43.7	27.3	N/A	64.7	N/A	74.9	N/A
2019-03-23	55.7	50.2	47	43	27.1	N/A	63.4	N/A	74.7	N/A
2019-03-24	55.8	49.1	46	41.2	32.4	N/A	62.6	N/A	75.2	N/A
2019-03-25	54.2	49.3	44.9	36.3	33.3	N/A	65	N/A	76.1	N/A
2019-03-26	55.1	49.6	46.7	37.5	34.9	27	64	60.3	76.4	71.6
2019-03-27	60.2	49.9	47.5	38.6	33.3	N/A	62.4	N/A	74.9	N/A
2019-03-28	56.5	50.1	49.6	39.6	28.9	N/A	63.9	N/A	76.5	N/A
2019-03-29	57.1	51	47.6	42.2	34.5	N/A	63.9	N/A	75.2	N/A
2019-03-30	53	49.4	41.4	38.3	N/A	26.3	N/A	59.6	N/A	70.9
2019-04-01	55.3	56.7	48.9	42.3	33.5	N/A	63.5	N/A	74.1	N/A
2019-04-02					29.1	N/A	62.7	N/A	73.7	N/A
Average	56.1	51.2	47.5	40.9	32	20.6	63.4	59.6	75.1	70.3

The graphs below detail the average L_{max}, L₉₀ and L_{Aeq} measurements across the measurement period, for this aircraft type, for both the day and night periods.

Day



Night

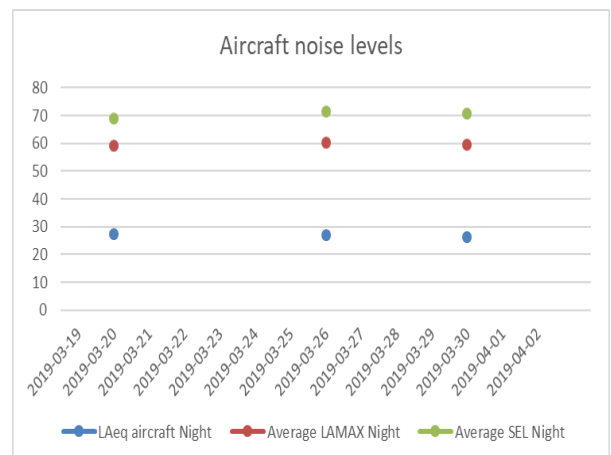
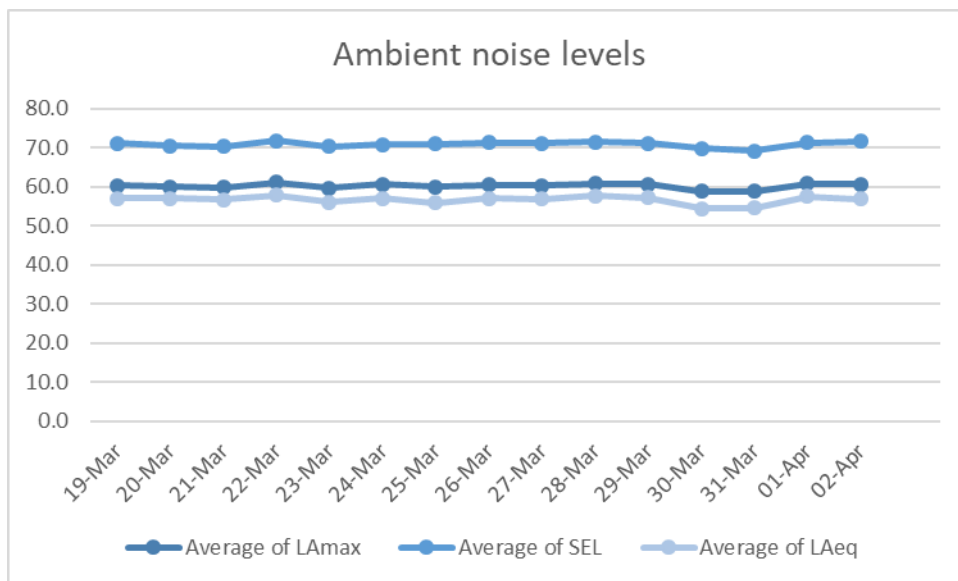


Table 17 Ambient noise levels

The table and graph below provide the levels of noise for Lmax, SEL, and LAeq, the term ambient refers to the levels of noise when aircraft noise is not present. The noise levels shown are averages for the full 24-hour period per day and provide an overview of the other noise sources and the general noise climate in this location.

Date	Average of Lmax	Average of SEL	Average of LAeq
19-Mar	60.3	71.2	57.1
20-Mar	60.1	70.5	57.0
21-Mar	59.9	70.4	56.7
22-Mar	61.2	71.8	57.9
23-Mar	59.7	70.4	56.1
24-Mar	60.7	70.8	57.1
25-Mar	60.0	71.1	55.9
26-Mar	60.5	71.4	57.0
27-Mar	60.3	71.2	56.9
28-Mar	60.8	71.6	57.7
29-Mar	60.6	71.1	57.2
30-Mar	58.9	69.8	54.5
31-Mar	58.9	69.1	54.5
01-Apr	60.8	71.3	57.5
02-Apr	60.6	71.7	56.9
Average	60.2	70.8	56.6



7.0 Analysis of noise monitoring results as a whole – LAeq, Lmax, L90 all aircraft types

Table 18: Summary of the main noise related parameters at all 7 monitoring site locations for all aircraft types.

The table below details the average background level (L90), average sound level (LAeq), average Lmax and average SEL values per day for all aircraft types at each monitoring position for both day and night time during each monitoring period.

Although the average level of aircraft noise (LAeq) may be much lower than the average level of the total noise at a site (ambient), the individual aircraft noise events will be clearly audible and distinctive above the ambient noise levels within each location. The distinctive character of aircraft noise which changes for each aircraft type, results in a noticeable increase in the level of noise over and above the ambient noise that will normally be heard at the location, for each individual aircraft measurement (Lmax).

Table 18

Location	Daytime ambient	Nighttime ambient	Daytime background	Nighttime background	LAeq aircraft Day	LAeq aircraft Night	Average LAmx Day	Average LAmx Night	Average SEL Day	Average SEL Night
1	57.3	50.9	48.2	43.2	32	22.3	64.2	62.1	76.6	73.7
2	55.7	50.9	51.8	45.3	29.2	17.6	65.1	58.6	75.1	67.8
3	57.3	50.9	48.2	43.2	32.7	23.8	64.2	62.1	76.6	73.6
4	53.3	48.1	48	41.3	21.1	13.4	60.5	53.7	71.2	65
5	54.2	50.4	47.8	41.8	N/A	N/A	N/A	N/A	N/A	N/A
6	55.1	49.6	43.2	36.7	38.4	34.7	67.2	70.8	78.4	81.7
7	56.1	51.2	47.5	40.9	33.1	22.6	63.6	60.7	75.3	71.4

8.0 Summary of content in section 6:

Sections 6 and 7 provide data which is summarised in the table below. The table provides further information on the aircraft types analysed for each location. Due to the dispersed nature of the monitoring sites it is not possible to directly compare the data for each location as the noise climate, aircraft type and altitude of the aircraft in each location can be quite different from site to site.

Table 19

locations	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7
Number of aircraft noise events	87	58	2504	7	16	2086	49
Average maximum noise level of aircraft noise events (L _{Amax}) Aircraft type A319	N/A	N/A	71.75	N/A	N/A	72	N/A
Average maximum noise level of aircraft noise events (L _{Amax}) Aircraft type SF34	67.1	65.6	67.55	57.4	N/A	69.4	66.2
Average maximum noise level of aircraft noise events (L _{Amax}) Aircraft type B738	N/A	N/A	70.7	N/A	N/A	69.07	N/A
Average noise duration of aircraft noise events Aircraft type A319	N/A	N/A	28.95	N/A	N/A	53.5	N/A
Average noise duration of aircraft noise events Aircraft type SF34	40.65	20.05	16.65	30.6	N/A	45.2	39.7
Average noise duration of aircraft noise events Aircraft type B738	N/A	N/A	36.1	N/A	N/A	59	N/A
Average Altitude Aircraft type A319	N/A	N/A	3118.5	N/A	N/A	4466.9	N/A
Average Altitude Aircraft type SF34	4758.75	4429.55	2604.7	4256.8	N/A	3449.2	4507
Average Altitude Aircraft type B738	N/A	N/A	3491.1	N/A	N/A	5037.5	N/A
Average SEL Aircraft type A319	N/A	N/A	79.7	N/A	N/A	79.9	N/A
Average SEL Aircraft type SF34	76.55	72.45	74.1	64.8	N/A	76.5	74.8
Average SEL Aircraft type B738	N/A	N/A	81.6	N/A	N/A	80.6	N/A
Average daily Aircraft noise level LA _{eq}	50.3	71.3	17.1	66.9	N/A	62.2	33.1
Average nightly Aircraft noise level LA _{eq}	45.3	17.6	45.3	20.2	N/A	34.7	22.6
Average daily ambient noise level LA _{eq}	57.3	55.7	59.2	53.3	54.2	55.1	56.1
Average nightly ambient noise level LA _{eq}	50.9	50.9	57.1	48.1	50.4	49.6	51.2
Average Background level Day (LA ₉₀)	48.2	51.8	56	48	47.8	43.2	47.5
Average Background level Night (LA ₉₀)	43.2	45.3	54	41.3	41.8	36.7	40.9

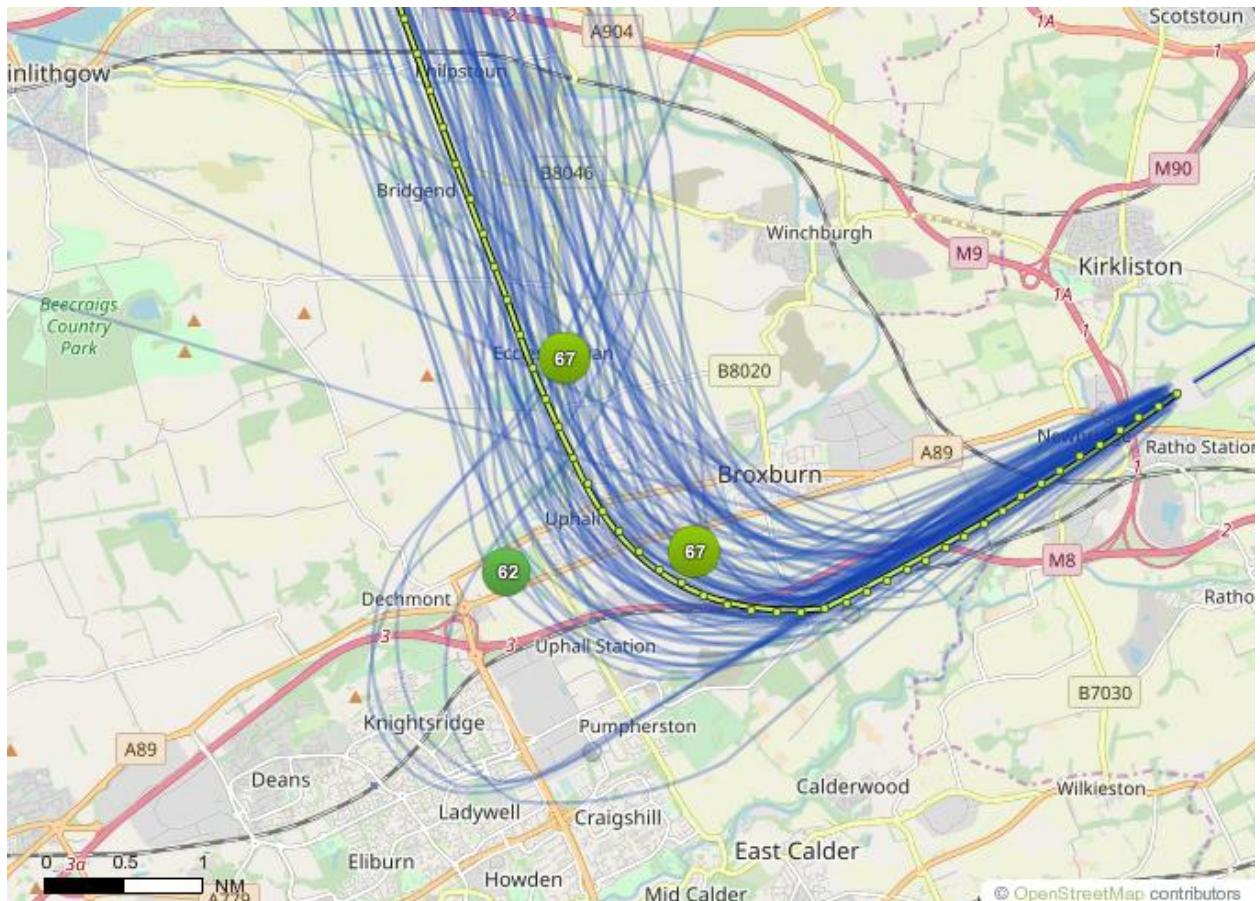
Appendix

Flight track images – SNAPSHOT per site
Image showing locations of all monitors (GDPR Compliant)
Runway utilization for time period – tables
Flights per aircraft type per monitoring period

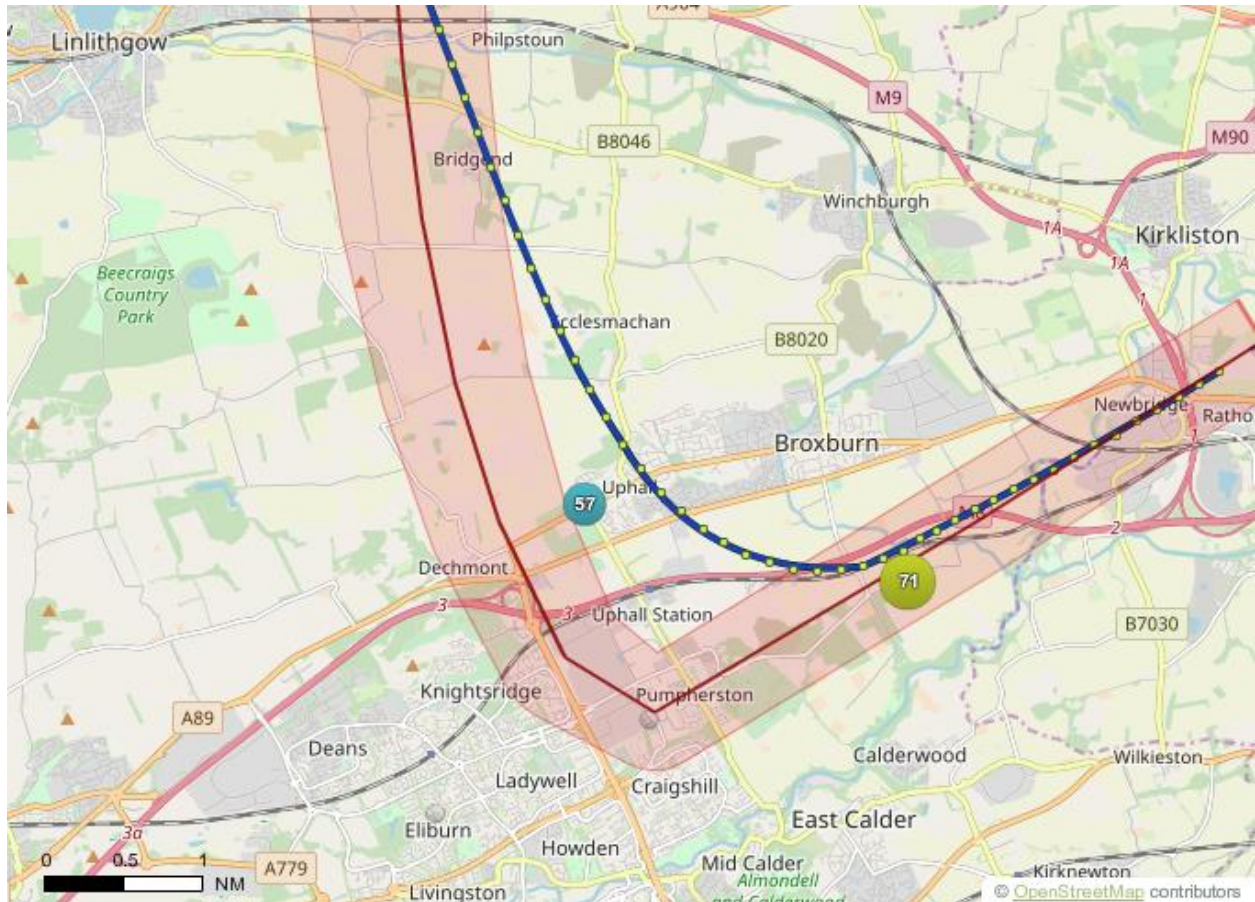
Appendix A

Flight track images – This provides a snapshot during the relevant date period of the flights passing in the vicinity of the noise monitors for each site.

Locations 1, 2, 3



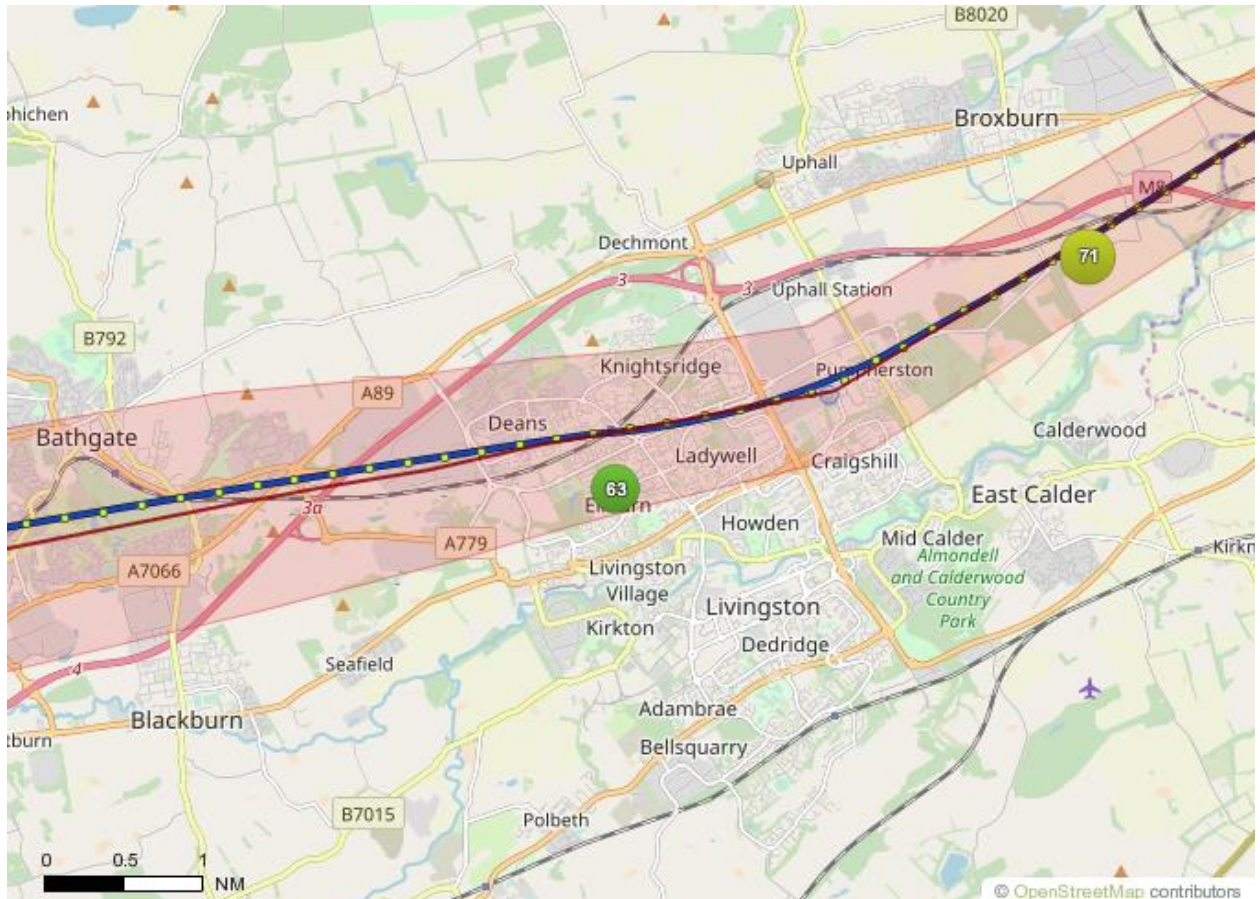
Location 4
Shown by the blue circle



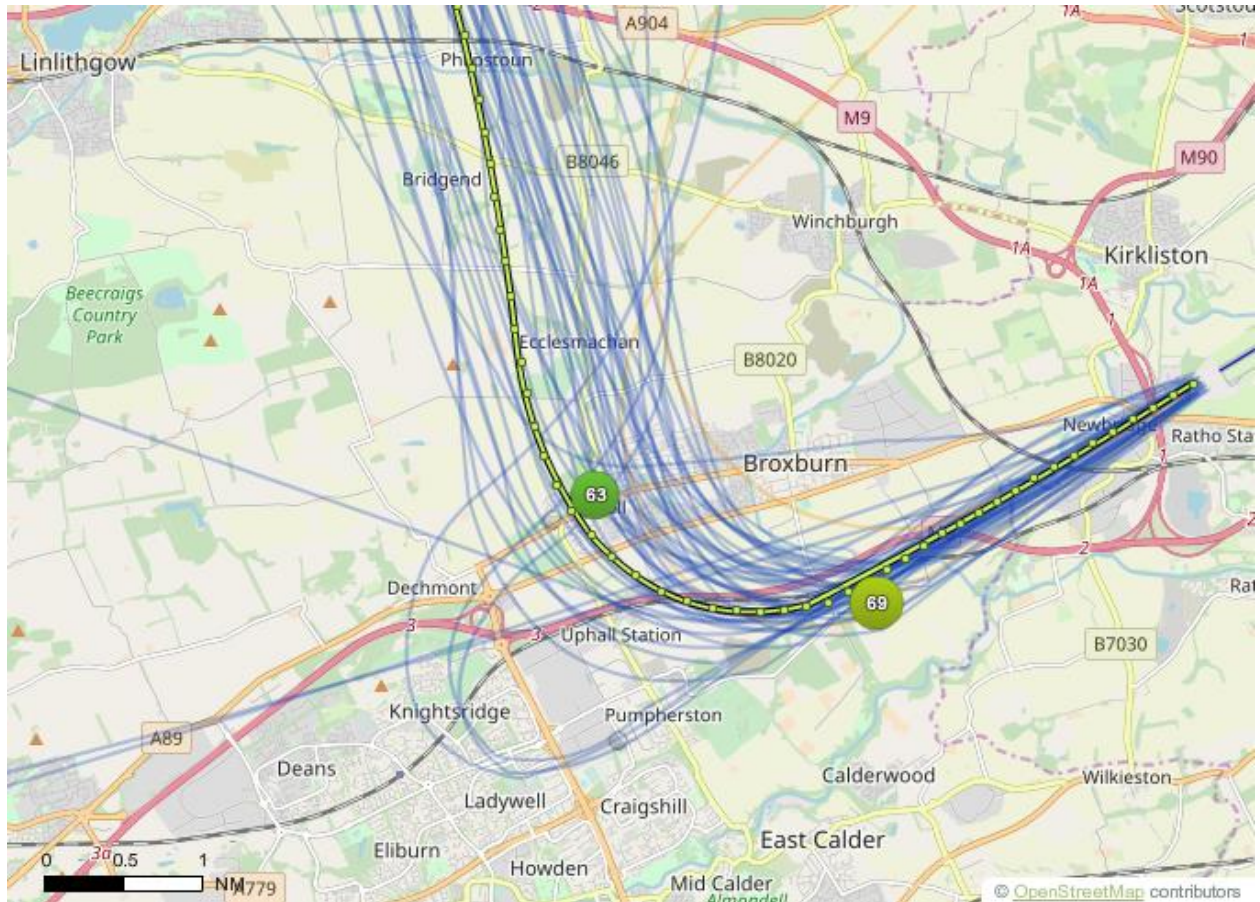
Location 5
Shown by the blue circle



Locations 6
Shown by the bright green circle



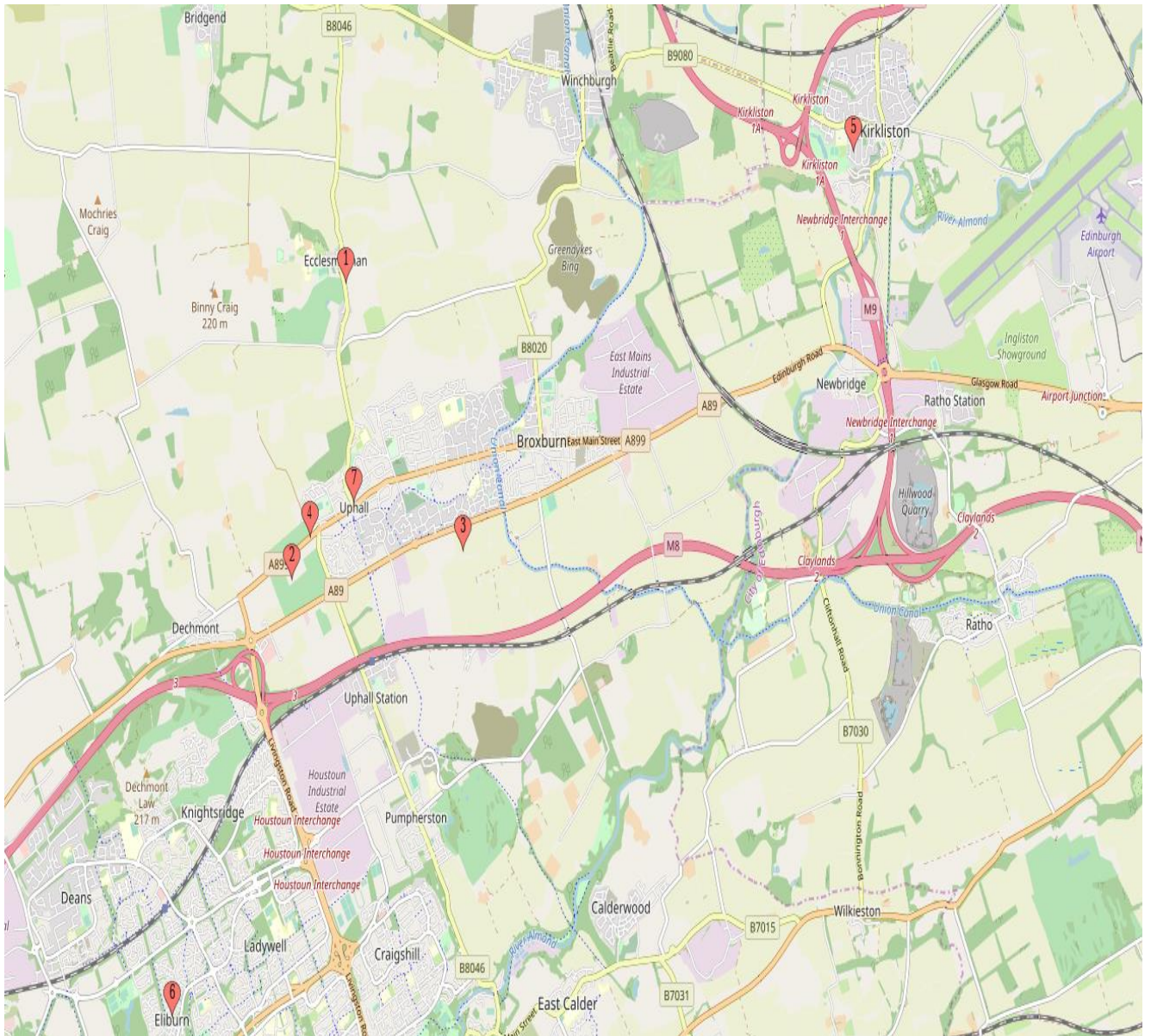
Locations 7
Shown by the bright green circle



Appendix B

Image showing locations of monitors (GDPR Compliant)

All locations



Appendix C

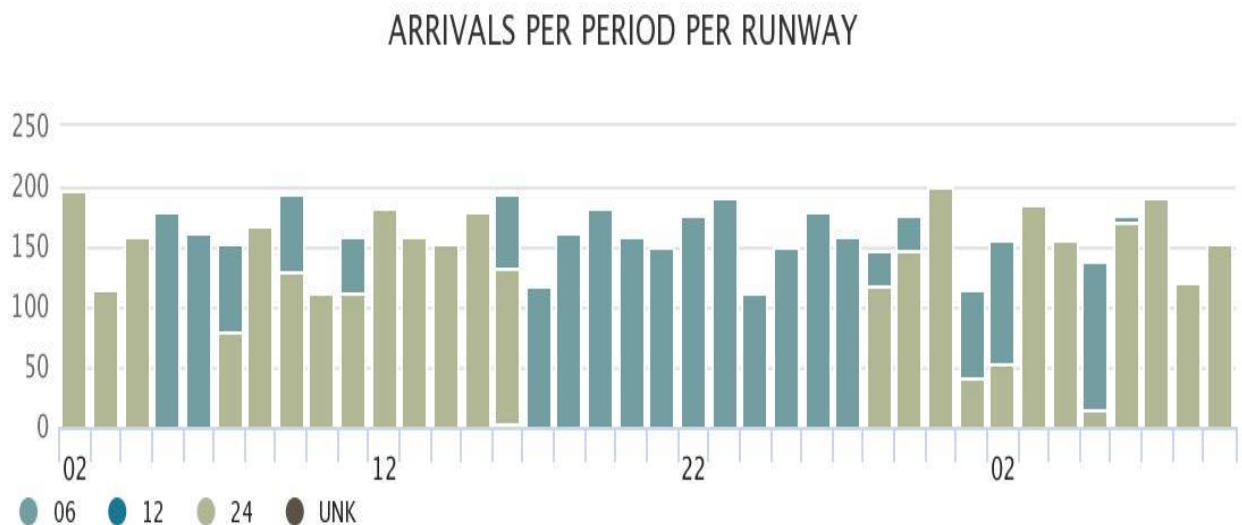
Runway utilization for time period – tables.

Within the tables information may show as UNK (unknown) or assigned to the decommissioned runway 12/30, this is due to aircraft carrying out a 'go-around' or aircraft transiting through our airspace.

Location 1, 2 and 3

Date 02/11/2018 – 09/12/2018

Arrivals per runway during date period 02/11/2018 – 09/12/2018



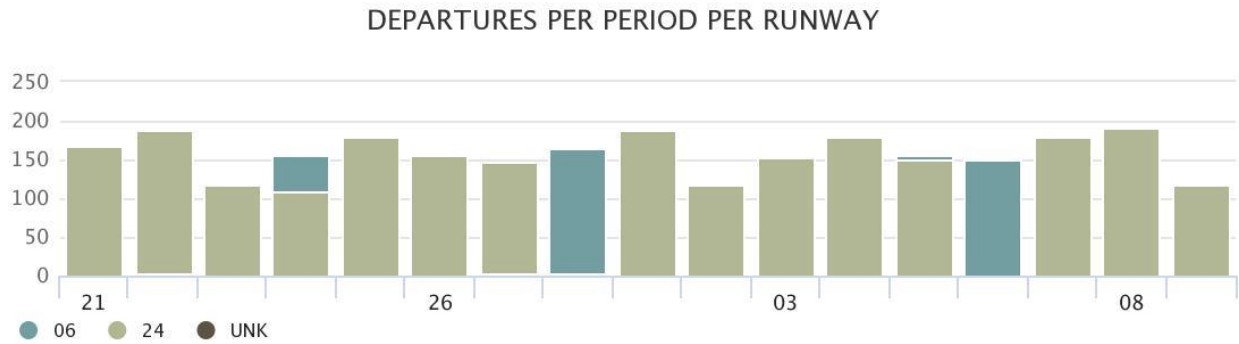
Departures per runway during date period 02/11/2018 – 09/12/2018



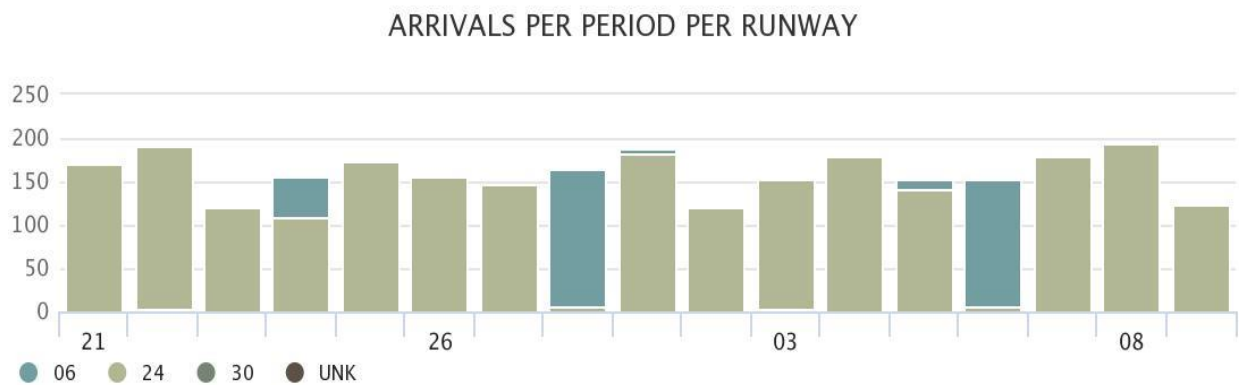
Location 4, 5 and 6

Date 21/02/2019 – 09/03/2019

Departures per runway during date period 21/02/2019 – 09/03/2019



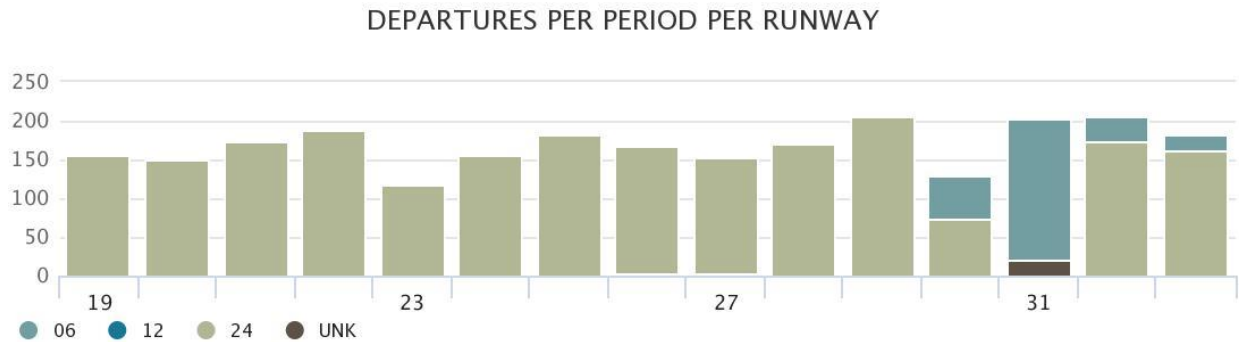
Arrivals per runway during date period 21/02/2019 – 09/03/2019



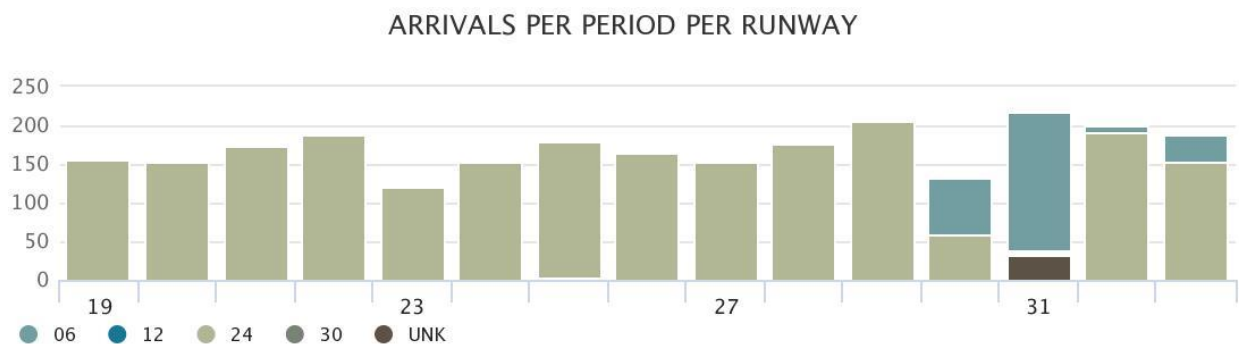
Location 7

Date 19/03/2019 – 02/04/2019

Departures per runway during date period 19/03/2019 – 02/04/2019



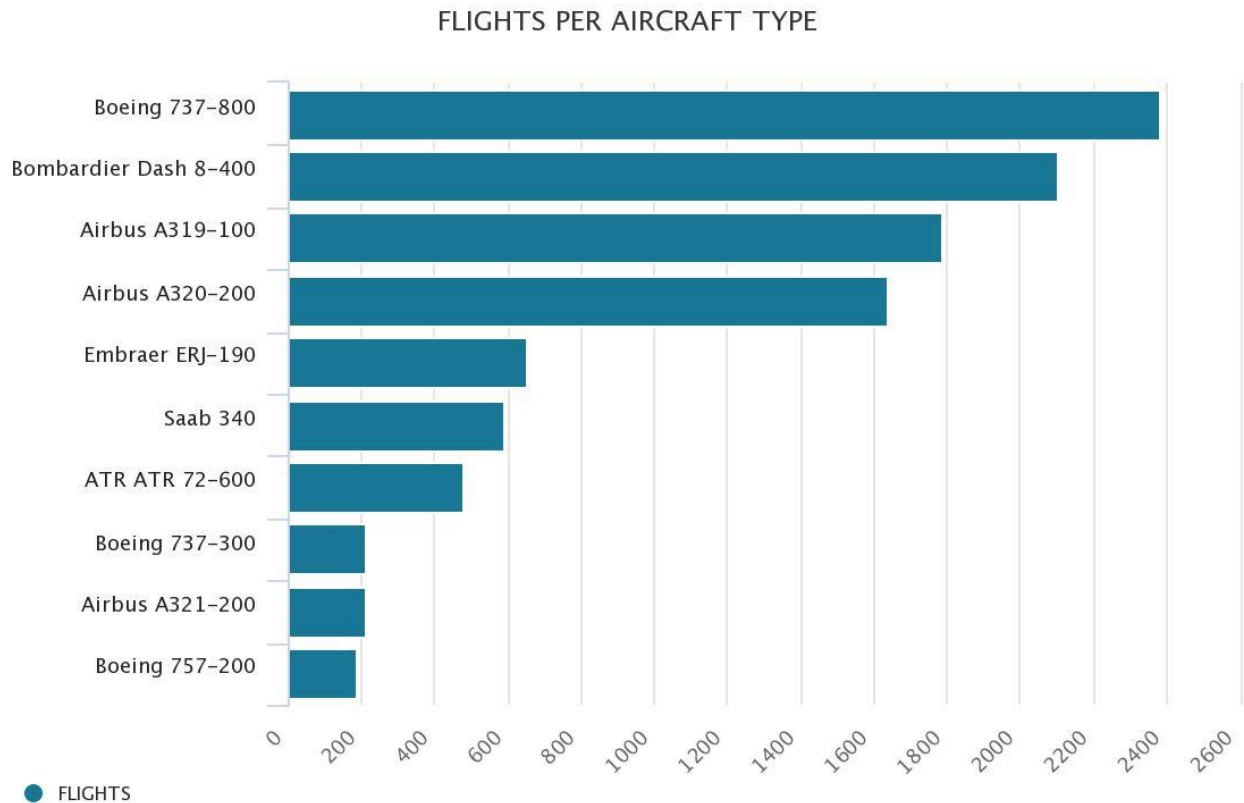
Arrivals per runway during date period 19/03/2019 – 02/04/2019



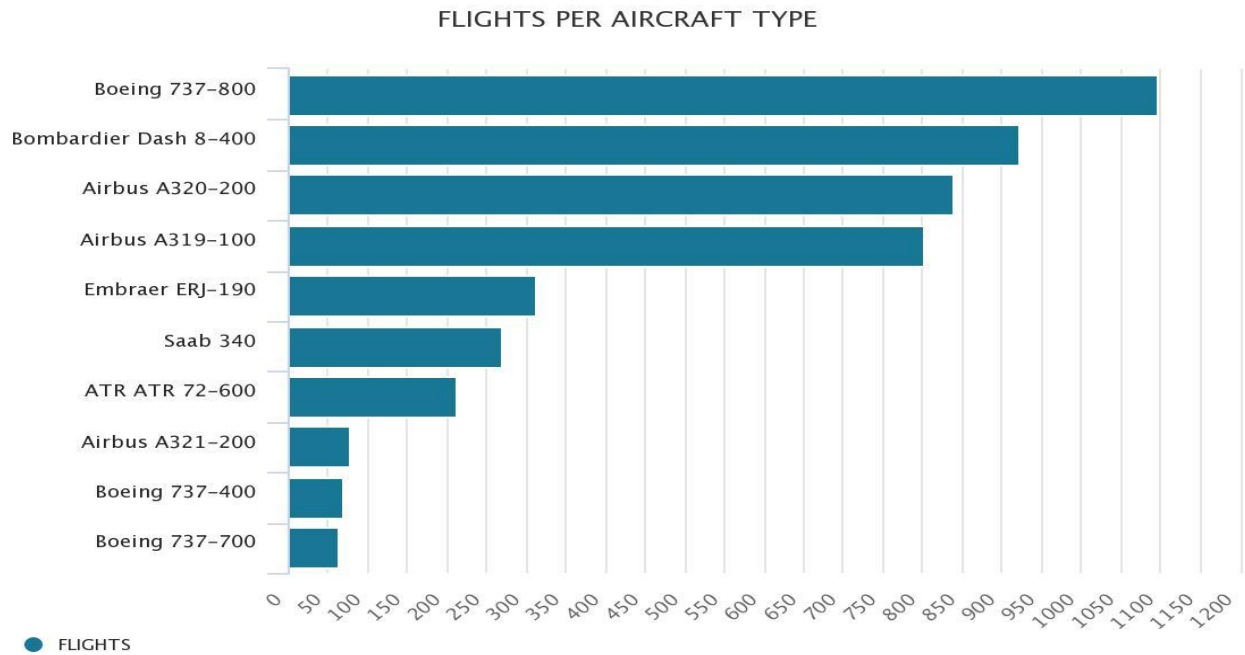
Appendix D

Flights per aircraft type

Date period 02/11/2018 – 09/12/2018 noise monitoring locations 1, 2 and 3 for all flight paths



Date period 21/02/2019 – 09/03/2019 noise monitoring locations 4, 5 and 6 for all flight paths



Date period 19/03/2019 – 02/04/2019 noise monitoring location 7 for all flight paths.

