

Community Noise Monitoring Melbourne, 16 – 23 June 2010

Introduction

As a thriving regional airport, over 4 million passengers fly through East Midlands Airport each year. In addition, around 300,000 tonnes of mail and cargo are handled at the airport by logistics companies including DHL, UPS and Royal Mail. We are committed to our local communities, and understand that aircraft noise can be intrusive.

In response to requests from Melbourne Parish Council and residents of the village, the Airport's Environment Department conducted noise monitoring at a residential property on Derby Road, Melbourne. A noise monitor was installed between 16 and 23 June 2010 with the aim of analysing noise levels in relation to UK Planning Policy Guidance concerning noise.

East Midlands Airport is equipped with one runway which operates in two modes – Runway 09 (due east), and Runway 27 (due west). To ensure the safe operation of aircraft it is a requirement that take-offs and landings are performed into the wind, as such the active runway mode is dictated by the prevailing wind direction.

To minimise the impact of aircraft noise on local population centres, the Airport operates a system of noise preferential routes (see appendix 1) for departing aircraft. The effect of these routes is that when aircraft operate on runway 27 (i.e. depart towards Melbourne) they turn north or south before reaching the village and as a result they do not directly overfly the village in general.

In order to safely reduce speed and altitude, landing aircraft usually need to undertake a period of straight flight towards the Airport's runway. As such it is not possible to re-route these operations and as a result when aircraft operate on runway 09 (i.e. land over Melbourne) they do routinely overfly the village. However, in recent years the airport has introduced a preferential runway policy whereby aircraft continue to operate on runway 27 even when there is a light easterly wind. This policy enables aircraft to continue to operate on runway 27 and by implication to avoid flying over Melbourne. The introduction of a preferential runway policy has increased the proportion of westerly operations from typically 70% to more than 80%. The practical effect of this policy has been to reduce the number of aircraft flying over the village of Melbourne by around one third.

Methodology

Noise monitoring equipment was installed in the garden of a residential property located approximately 6km due west of the airport. The property is well placed to enable accurate analysis of aircraft noise in Melbourne, particularly since it is sited directly beneath the approach to runway 09.

Noise levels were continuously monitored between 16 and 23 June 2010 (with the exception of the period between 1am 19 June and 4pm 21 June when technical difficulties resulted in a power shortage). In reviewing noise levels at the property, it is important to note that the noise monitoring equipment used detects noise events from all sources. As such, a variety of sources contribute to noise levels, including traffic using the B587 which is adjacent to the sampling location.

In relation to the collation of data, noise levels were recorded and are hereafter reported in A weighted decibels, dB(A), which seek to replicate the response of the human ear, with L_{Aeq} values representing the “average” noise energy over a given time period, and L_{Amax} figures being the highest or maximum noise level during a given time period.

All times hereafter are given in the 24hr format (HHMM), and refer to British Summer Time (BST) unless otherwise stated. This report considers daytime hours to be from 0700-2300 (local time) and night hours to be from 2300-0700 (local time), this being consistent with UK Department for Environment, Food and Rural Affairs (DEFRA) best practice, UK PPG24 Planning Policy Guidance, and the published airport noise contour maps

Results

A complete results dataset is attached as appendix 2, this details hourly and period (i.e. day, or night) L_{Aeq} and L_{Amax} figures, and also indicates the runway in use. Appendix 3 provides a useful summary of this data.

Discussion

Runway operation

During the sampling period, aircraft were initially operating on runway 09 (arriving over Melbourne). Towards the end of the sampling period, the meteorological conditions changed and operations switched to runway 27 (departing over Melbourne). As outlined above, this is the most common, and preferential operating mode at East Midlands Airport, with typically 80% of operations undertaken in this mode.

Figure 1 demonstrates the percentage of operations in each runway mode for each day and night period during the noise monitoring exercise. This graphic also demonstrates that Air Traffic Controllers at the airport were successful in applying our preferential runway policy.

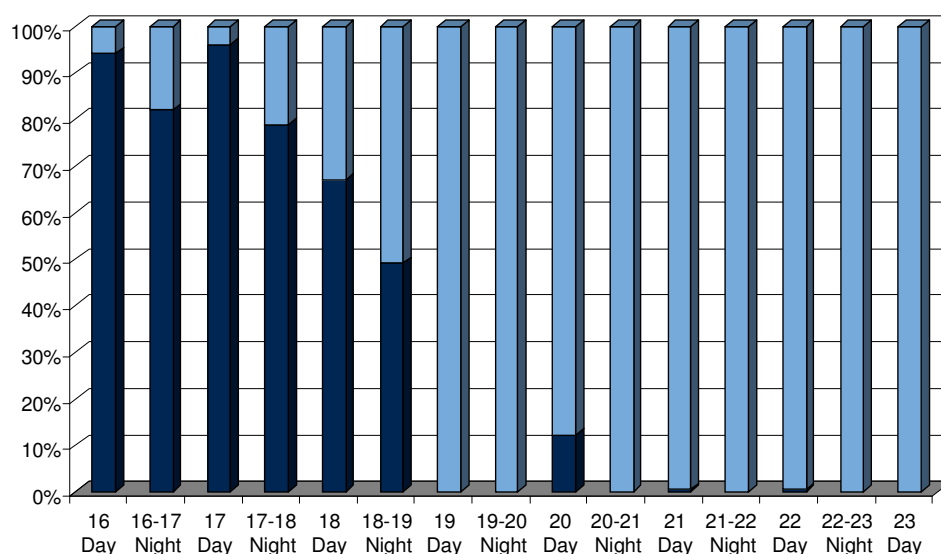


Figure 1. Operations by runway (%) for day and night periods, 16th to 23rd June 2010.
Runway 09 = Dark Blue, Runway 27 = Light Blue.

LEQ Analysis

Table 1 details the minimum, maximum and average noise levels experienced at the sampling location for each runway mode. During runway 09 operations, noise levels were found to be higher during the day than at night, however with runway 27 in use, night noise levels were found to be higher than those during the day. This is most likely due to the higher proportion of large aircraft types climbing out over the village at night during runway 27 operations, as opposed to day time operations (when typically smaller aircraft types are operated), or periods when aircraft approach (runway 09) over the Melbourne and their thrust settings are accordingly lower.

Total Noise Levels - $L_{Aeq,T}$ (dB)						
	Runway 09			Runway 27		
	Day	Night	24hr	Day	Night	24hr
Min	49.5	48.8	48.8	48.3	38.6	38.6
Max	61.9	58.3	61.9	54.7	58.3	58.3
Average	56.5	56.5	56.5	51.2	52.8	51.9

Table 1. LEQ (dB) results summary for Day, Night and 24hr time periods.

LEQ and Planning Guidance Notes

In order to place these noise levels in context it is useful to consider the guidance provided by Planning Policy Guidance Note PPG24, Planning and Noise. Whilst this document applies only to new developments it also provides a very useful context for this study.

PPG24 defines four noise exposure categories (NECs), detailed in table 2, which assumes a location to be subject to a number of differing noise sources, the most sensitive case used by PPG24.

NEC	DAYTIME (LEQ)	NIGHT (LEQ)
A	<55 dB	<45 dB
B	55-63 dB	45-57 dB
C	63-72 dB	57-66 dB
D	>72 dB	>66 dB

Table 2. NEC Boundaries ('Mixed Source')

Hourly L_{Amax} and L_{Aeq} levels throughout the sampling period are reported in figure 2 in relation to the PPG24 NECs, with the sampling location allocated an NEC band for each day and night time period in table 3.

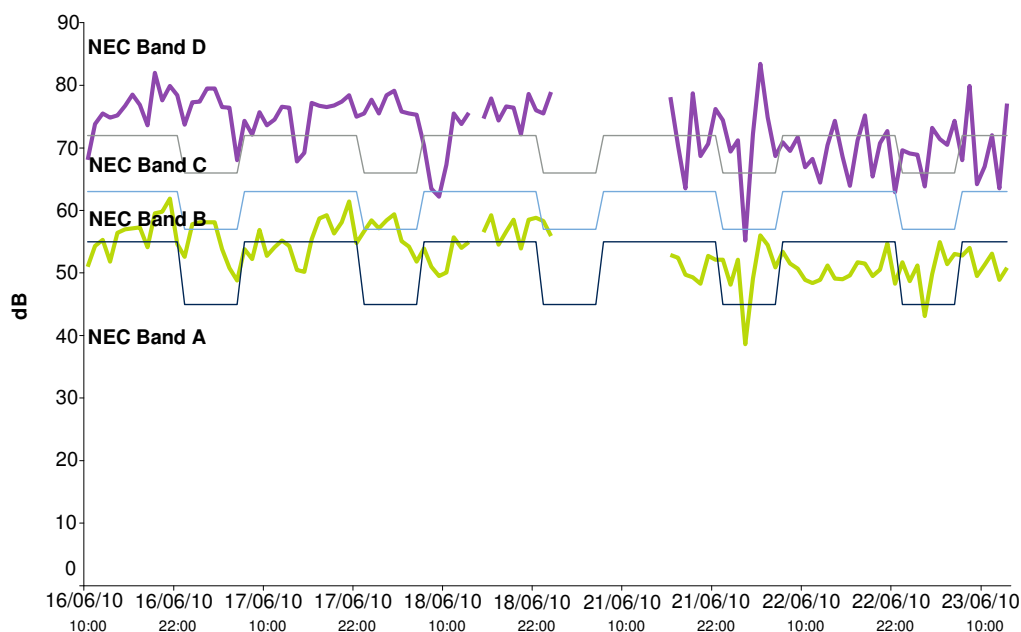


Figure 2. Hourly L_{Amax} (Purple) and L_{Aeq} (Green) values, with NEC bands labelled.

NEC	Runway 09			Runway 27		
	Day	Night	Total	Day	Night	Total
A	0	0	0	3	0	3
B	3	1	4	0	2	2
C	0	1	1	0	1	1

Table 3. Distribution of LEQ levels in relation to NEC categories.

Considering the NECs resulting from PPG24 and the results of this study, when runway 27 is in use, Melbourne can be considered within NEC A during the day and NEC B at night. However during periods of Easterly winds and runway 09 operations (approximately 20% of the time) the exposure categories increase to NEC B (day) and B/C (night).

Using the dataset obtained, and assuming a 20:80 split between operations on runways 09 and 27 respectively, it is possible to calculate and predict an average annual LEQ level. As such, over an annual period, Melbourne would be considered within NEC A during the day ($L_{Aeq} = 52.9$ dB), and NEC B during the night ($L_{Aeq} = 53.8$ dB).

To put these NEC bands in perspective, within:

NEC A the guidance considers that *'Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level'*.

Within NEC B the guidance considers that *'Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise'*.

***L_{Amax}* Events**

The guidance in PPG24 also makes provision for locations which experience intermittent high noise events at night, including aircraft operations. The guidance states that *'Sites where individual noise events regularly exceed 82 dB L_{Amax} in any hour should be treated as being in NEC C.'* Maximum noise values for each hour of day and night periods are detailed in both appendix 2 and 3.

Appendix 2 also specifies the aircraft type and flight reference associated with the greatest L_{Amax} event of each period. These details are summarised in table 4, which correlates aircraft types to L_{Amax} events for each day and night period. It is notable that the vast majority of aircraft types listed are wide bodied freight aircraft and that having consulted the airport's flight data system and air traffic control radar records there are also a number of significant noise events which do not correlate with an aircraft movement. As such it is important to note that a number of L_{Amax} events are the result of another source of noise, most likely road traffic near to the sampling location.

Aircraft	Runway	Day	Night	Total
Airbus A300	09	1	2	3
Boeing 767-200F	09	1	0	1
No Flight	09	1	0	1
No Flight	27	2	1	3
Advanced Turbo-Prop	27	1	0	1
Airbus A300	27	0	1	1
Boeing 767-300	27	0	1	1

Table 4. Day/Night Period L_{Amax} events correlated to specific aircraft types

Conclusion

Whilst aircraft are departing in the direction of Melbourne, noise levels are reduced by noise mitigation procedures including noise preferential departure routes which require aircraft to turn before overflying the village. This study has found that, although there is little difference between noise levels during the day compared to at night, noise levels are however higher when aircraft are arriving over Melbourne.

Whilst for safety reasons the airport is unable to re-route aircraft arriving over Melbourne, a preferential runway policy has been introduced as part of our commitment to reducing aircraft noise. The introduction of this policy has reduced the proportion of arrivals over the village of Melbourne by around one third, and as such the noise levels will have reduced.

The airport aims to further reduce aircraft noise at Melbourne by working with airline customers to increase the number of continuous descent approaches (CDAs) to the airport. This technique reduces thrust settings, and as such aircraft noise on arrival by implementing a single, continuous descent which increases the altitude of aircraft when compared to the stepped descent approach once considered a standard procedure.

Interested parties are invited to review the performance of airlines operating at East Midlands Airport online where monthly CDA and departure track compliance figures are provided for operators of more than ten flights in any one calendar month.

Further Information

For further information, or to review our wider environmental policies please visit www.eastmidlandsairport.com/environment or contact us:

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Appendix 1 – East Midlands Airport Noise Preferential Routes



Appendix 2

Day 16/06	Hour Beginning	L _{Aeq} (dBA)	L _{Amax} (dBA)			
	07:00	ND	ND			
	08:00	ND	ND			
	09:00	ND	ND			
	10:00	51.0	68.1			
	11:00	54.3	73.8			
	12:00	55.3	75.5			
	13:00	51.8	74.8			
	14:00	56.4	75.2			
	15:00	57.0	76.7			
	16:00	57.1	78.5			
	17:00	57.3	76.9			
	18:00	54.1	73.6			
	19:00	59.5	82.0			
	20:00	59.8	77.6	Runway in use	09	@ 19:00:00 (B76Y, CVG-EMA)
	21:00	61.9	79.9	L _{Amax} DAY (dB)	82.0	
	22:00	54.6	78.4	L _{Aeq,16h} DAY (dB)	57.2	

	Hour Beginning	L _{Aeq} (dBA)	L _{Amax} (dBA)			
Night 16/06 - 17/06	23:00	52.6	73.7			
	00:00	57.8	77.3			
	01:00	58.1	77.4			
	02:00	58.1	79.5			
	03:00	58.1	79.5			
	04:00	53.8	76.5	Runway in use	09	
	05:00	50.8	76.4	L _{Amax} NIGHT (dB)	79.5	@ 02:46 & 03:37
	06:00	48.8	68.0	L _{Aeq,8h} NIGHT (dB)	56.0	(A300, BRU-EMA) (A300, LEJ-EMA)
Day 17/06						
	07:00	53.8	74.3			
	08:00	52.2	72.1			
	09:00	56.9	75.7			
	10:00	52.7	73.6			
	11:00	54.1	74.5			
	12:00	55.2	76.6			
	13:00	54.3	76.4			
	14:00	50.5	67.8			
	15:00	50.2	69.2			
	16:00	55.4	77.2			
	17:00	58.7	76.7			
	18:00	59.2	76.5			
	19:00	56.3	76.8			
	20:00	58.1	77.4	Runway in use	09	
	21:00	61.4	78.4	L _{Amax} DAY (dB)	78.4	@ 22:23
	22:00	54.8	75.0	L _{Aeq,16h} DAY (dB)	56.3	(NO FLIGHT)

	Hour Beginning	L _{Aeq} (dBA)	L _{Amax} (dBA)			
Night 17/06 - 18/06	23:00	56.7	75.5			
	00:00	58.4	77.7			
	01:00	57.1	75.5			
	02:00	58.4	78.4			
	03:00	59.4	79.1			
	04:00	55.1	75.8	Runway in use	09	
	05:00	54.2	75.5	L _{Amax} NIGHT (dB)	79.1	@ 03:34
	06:00	51.8	75.3	L _{Aeq,8h} NIGHT (dB)	57.0	(A300, LEJ-EMA)
Day 18/06						
	07:00	53.9	70.4			
	08:00	51.0	63.5			
	09:00	49.5	62.2			
	10:00	50.1	67.3			
	11:00	55.7	75.5			
	12:00	54.0	73.8			
	13:00	54.9	75.6			
	14:00	ND	ND			
	15:00	56.5	74.7			
	16:00	59.2	77.9			
	17:00	54.5	74.4			
	18:00	56.6	76.6			
	19:00	58.5	76.4			
	20:00	53.9	72.2	Runway in use	09	
	21:00	58.5	78.6	L _{Amax} DAY (dB)	78.6	@ 21:31
	22:00	58.8	76.0	L _{Aeq,16h} DAY (dB)	56.0	(A300, DUB-EMA)

	Hour Beginning	L _{Aeq} (dBA)	L _{Amax} (dBA)			
Night 18/06 - 19/06	23:00	58.3	75.5			
	00:00	55.9	78.9			
	01:00	ND	ND			
	02:00	ND	ND			
	03:00	ND	ND			
	04:00	ND	ND	Runway in use	27	
	05:00	ND	ND	L _{Amax} NIGHT (dB)	78.9	@ 00:20
	06:00	ND	ND	L _{Aeq,8h} NIGHT (dB)	57.3	(NO FLIGHT)
Day 19/06						
	07:00	ND	ND			
	08:00	ND	ND			
	09:00	ND	ND			
	10:00	ND	ND			
	11:00	ND	ND			
	12:00	ND	ND			
	13:00	ND	ND			
	14:00	ND	ND			
	15:00	ND	ND			
	16:00	ND	ND			
	17:00	ND	ND			
	18:00	ND	ND			
	19:00	ND	ND			
	20:00	ND	ND	Runway in use	27	
	21:00	ND	ND	L _{Amax} DAY (dB)		@
	22:00	ND	ND	L _{Aeq,16h} DAY (dB)		

	Hour Beginning	L _{Aeq} (dBA)	L _{Amax} (dBA)			
Night 19/09 - 20/09	23:00	ND	ND			
	00:00	ND	ND			
	01:00	ND	ND			
	02:00	ND	ND			
	03:00	ND	ND			
	04:00	ND	ND	Runway in use	27	
	05:00	ND	ND	L _{Amax} NIGHT (dB)		@
	06:00	ND	ND	L _{Aeq,8h} NIGHT (dB)		
Day 20/09						
	07:00	ND	ND			
	08:00	ND	ND			
	09:00	ND	ND			
	10:00	ND	ND			
	11:00	ND	ND			
	12:00	ND	ND			
	13:00	ND	ND			
	14:00	ND	ND			
	15:00	ND	ND			
	16:00	ND	ND			
	17:00	ND	ND			
	18:00	ND	ND			
	19:00	ND	ND			
	20:00	ND	ND	Runway in use	27	
	21:00	ND	ND	L _{Amax} DAY (dB)		@
	22:00	ND	ND	L _{Aeq,16h} DAY (dB)		

	Hour Beginning	L _{Aeq} (dBA)	L _{Amax} (dBA)			
Night 20/06 - 21/06	23:00	ND	ND			
	00:00	ND	ND			
	01:00	ND	ND			
	02:00	ND	ND			
	03:00	ND	ND			
	04:00	ND	ND	Runway in use	27	
	05:00	ND	ND	L _{Amax} NIGHT (dB)		@
	06:00	ND	ND	L _{Aeq,8h} NIGHT (dB)		
Day 21/06						
	07:00	ND	ND			
	08:00	ND	ND			
	09:00	ND	ND			
	10:00	ND	ND			
	11:00	ND	ND			
	12:00	ND	ND			
	13:00	ND	ND			
	14:00	ND	ND			
	15:00	ND	ND			
	16:00	52.9	78.1			
	17:00	52.4	70.3			
	18:00	49.7	63.5			
	19:00	49.3	78.7			
	20:00	48.3	68.7	Runway in use	27	
	21:00	52.7	70.6	L _{Amax} DAY (dB)	78.7	@ 19:26pm
	22:00	52.1	76.2	L _{Aeq,16h} DAY (dB)	51.4	(NO FLIGHT)

	Hour Beginning	L _{Aeq} (dBA)	L _{Amax} (dBA)			
Night 21/06 - 22/06	23:00	52.1	74.4			
	00:00	48.1	69.4			
	01:00	52.1	71.2			
	02:00	38.6	55.2			
	03:00	49.1	72.2			
	04:00	56.0	83.4	Runway in use	27	
	05:00	54.5	74.9	L _{Amax} NIGHT (dB)	83.4	@ 04:19am
	06:00	50.9	68.7	L _{Aeq,8h} NIGHT (dB)	52.0	(B763, EMA-PHL)
Day 22/06						
	07:00	53.4	70.9			
	08:00	51.5	69.5			
	09:00	50.7	71.7			
	10:00	48.9	66.9			
	11:00	48.4	68.2			
	12:00	48.9	64.4			
	13:00	51.2	70.4			
	14:00	49.1	74.3			
	15:00	49.0	68.6			
	16:00	49.6	63.9			
	17:00	51.7	71.2			
	18:00	51.5	75.2			
	19:00	49.5	65.4			
	20:00	50.5	70.7	Runway in use	27	
	21:00	54.7	72.7	L _{Amax} DAY (dB)	75.2	@ 18:21pm
	22:00	48.3	62.9	L _{Aeq,16h} DAY (dB)	50.8	(ATP, LPL-EMA)

	Hour Beginning	L _{Aeq} (dBA)	L _{Amax} (dBA)		
Night 22/06 - 23/06	23:00	51.7	69.6		
	00:00	48.7	69.1		
	01:00	51.2	68.9		
	02:00	43.1	63.8		
	03:00	49.8	73.2		
	04:00	54.9	71.4	Runway in use	27
	05:00	51.4	70.5	L _{Amax} NIGHT (dB)	74.3 @ 06:01am
	06:00	53.0	74.3	L _{Aeq,8h} NIGHT (dB)	51.4 (A300, EMA-BFS)
Day 23/06					
	07:00	52.8	68.0		
	08:00	54.0	79.9		
	09:00	49.5	64.2		
	10:00	51.3	67.0		
	11:00	53.1	72.0	Runway in use	27
	12:00	48.9	63.5	L _{Amax} DAY (dB)	79.9 @ 08:58am
	13:00	50.8	77.1	L _{Aeq,16h} DAY (dB)	51.8 (NO FLIGHT)

Airport Codes:

BFS Belfast International
 BRU Brussels
 CVG Cincinnati
 DUB Dublin
 EMA East Midlands Airport
 LEJ Leipzig
 LPL Liverpool
 PHL Philadelphia

Aircraft Type Codes:

A300 Airbus A300
 ATP Advanced Turbo-Prop
 B763 Boeing 767-300
 B76Y Boeing 767-200F

Appendix 3

Date	Period	Runway In Use	L _{Aeq} (dBA)	L _{Amax} (dBA)	NEC
16-Jun	Day	09	57.2	82.0	B
16-17-Jun	Night	09	56.0	79.5	B
17-Jun	Day	09	56.3	78.4	B
17-18-Jun	Night	09	57.0	79.1	C
18-Jun	Day	09	56.0	78.6	B
18-19-Jun	Night	27	57.3	78.9	C
19-Jun	Day	27	ND	ND	ND
19-20-Jun	Night	27	ND	ND	ND
20-Jun	Day	27	ND	ND	ND
20-21-Jun	Night	27	ND	ND	ND
21-Jun	Day	27	51.4	78.7	A
21-22-Jun	Night	27	52.0	83.4	B
22-Jun	Day	27	50.8	75.2	A
22-23-Jun	Night	27	51.4	74.3	B
23-Jun	Day	27	51.8	79.9	A