



**Farnborough  
Airport**

Town and Country Planning Act Section 106/299A

**Environment Report Quarter 4  
October – December 2008**

**TAG Farnborough Airport Ltd  
Farnborough  
Hampshire  
GU14 6XA**

## 1. INTRODUCTION

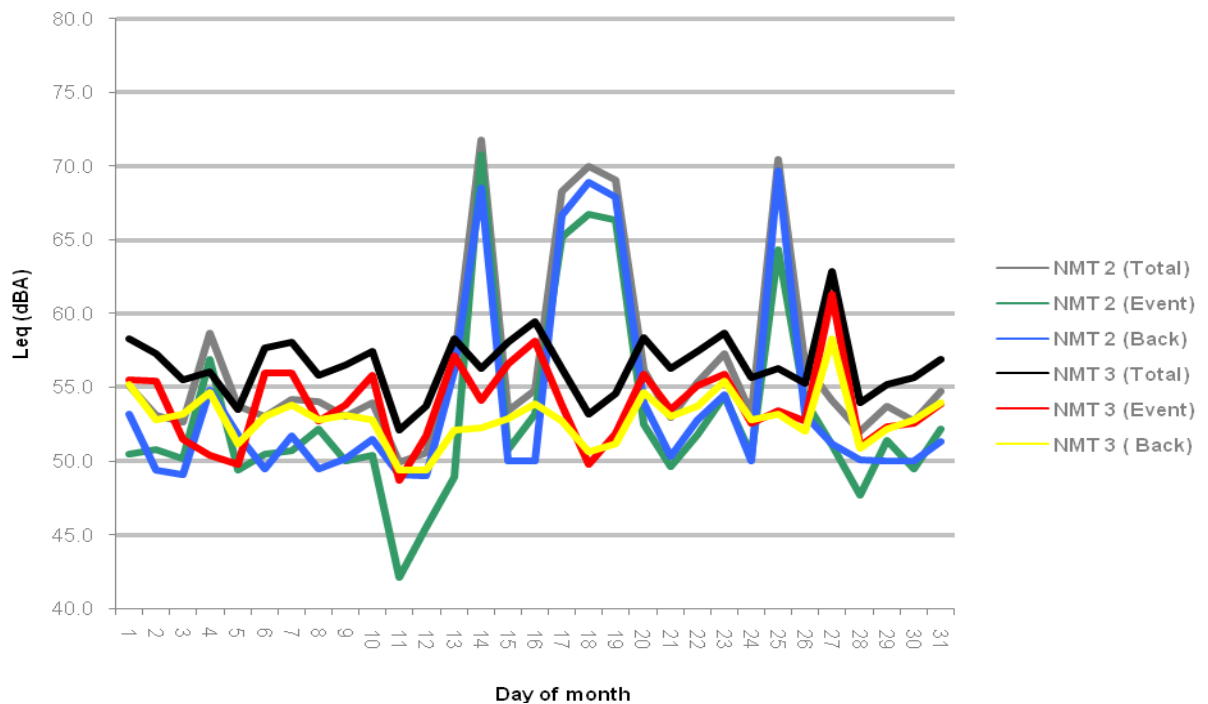
1.1 In continued compliance with the requirements of the agreement in place under Sections 106 and 299A of the Town and Country Planning Act 1990 between TAG Farnborough Airport and Rushmoor Borough Council, TAG hereby submits a report for the fourth quarter of 2008, (October to December 2008) detailing results of environmental monitoring as required by that agreement. In line with paragraph 2 (t), the content of this report was revised in consultation with Rushmoor Borough Council prior to the publication of the first quarterly report of 2007.

## 2. NOISE MONITORING

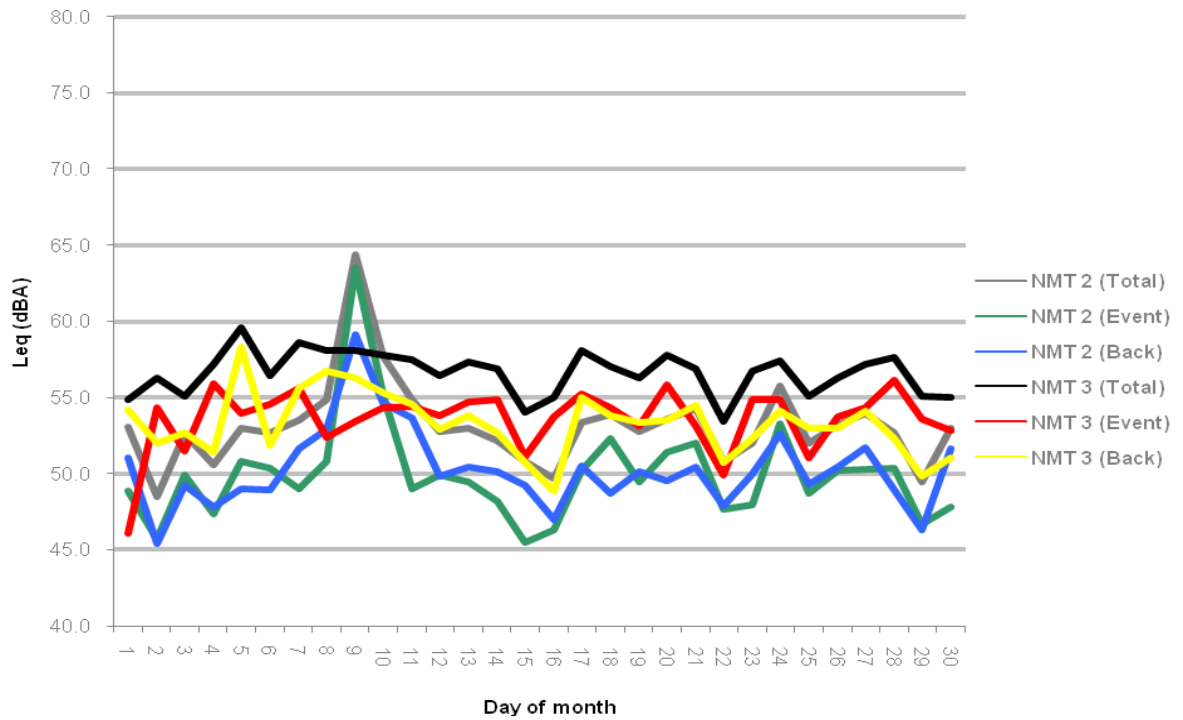
2.1 The two permanent noise monitoring terminals situated at Farnborough College and Tweseldown Racecourse continue their operation. The portable noise monitor is currently being utilised for noise monitoring in a range of locations local to the airport, in connection with the Quiet Flying Programme and associated Noise Abatement Trials.

2.2 Figures 1, 2 and 3 display  $L_{eq}$  data for correlated total noise levels (Total), aircraft events (Event) and background noise (Back), calculated as comparable A-weighted (dBA) values, by day of month and NMT for October, November and December respectively.

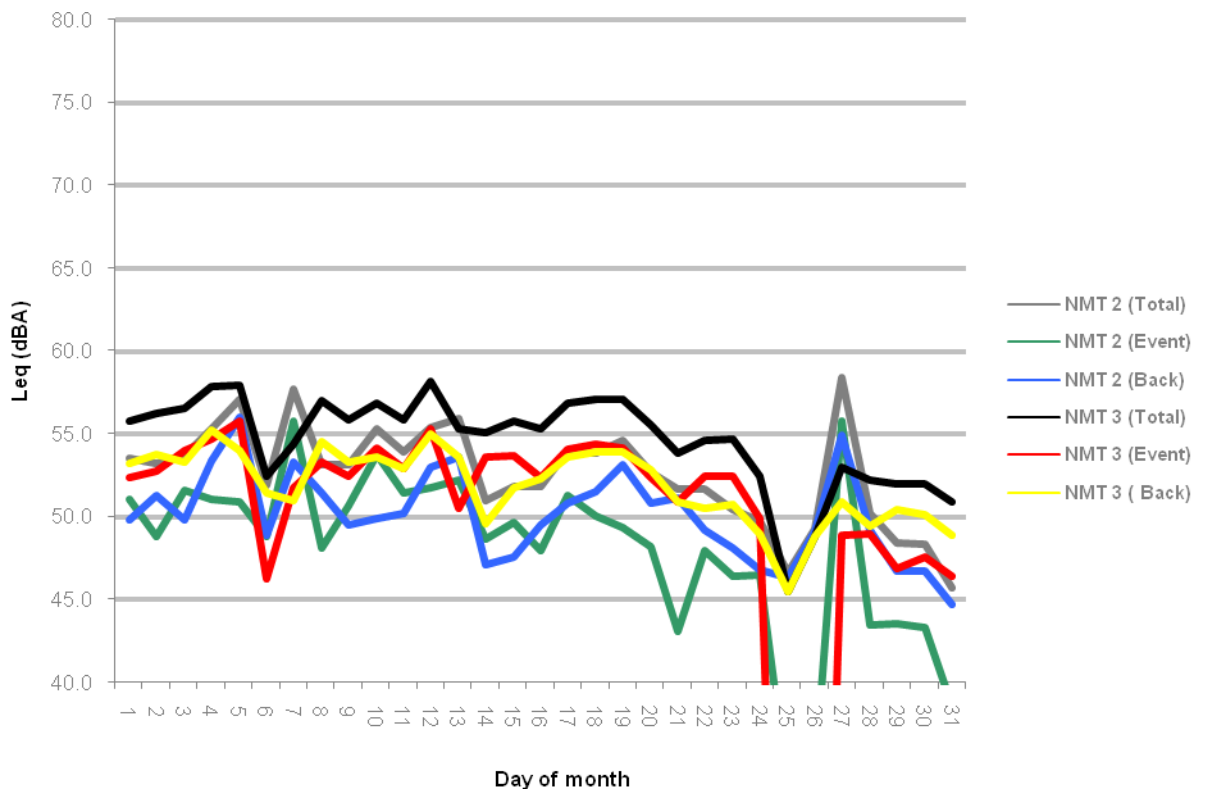
**Figure 1: Noise as  $L_{eq}$  Total, Event and Background, by Day of Month and Noise Monitoring Terminal, October 2008.**



**Figure 2:** Noise as  $L_{eq}$  Total, Event and Background by day of month and Noise Monitoring Terminal, November 2008.



**Figure 3:** Noise as  $L_{eq}$  Total, Event and Background by day of month and Noise Monitoring Terminal, December 2008.



- 2.3 Noise contours produced using the FAA's Integrated Noise Model (INM) for operations covering the entire duration of 2007 were submitted to Rushmoor in mid February 2008 in accordance with the requirements of the agreement between TAG and Rushmoor. The results of the modelling exercise undertaken are given below in Table 1, along with those included with the planning agreement. Contours relating to actual movements for the period January to June 2008 were supplied to Rushmoor Borough Council in mid August 2008 in accordance with clause 2o section c, of the Section 106 Planning Agreement. A contour covering the period January to December 2008 in addition to predicted contours for 2009 will be submitted to Rushmoor in mid February 2009 in accordance with the requirements of the agreement between TAG and Rushmoor
- 2.4 The predicted noise contours for 2008 were generated using 2007 actual movement data (flight tracks) with the assumption that over the duration of 2008 there would be a total of 30,000 movements. This 30,000 figure was derived from the permitted total of 28,000 with an additional 2,000 movements that would relate to flights that are not required to be declared as part of the Planning Permission agreement (i.e. military, flying club, diversions etc).

**Table 1: Results of INM Modelling exercise**

Leq dB (A)	Control Contours Predicted 20,000 movements (1997 mix)	Actual Contours Jan to Dec 2007 (KM <sup>2</sup> ) (actual 2007 movements)	Predicted Contours Jan to Dec 2008 (KM <sup>2</sup> ) (30,000 movements 2007 fleet mix)
55	9.07	4.66	4.92
60	4.03	1.88	1.98
65	1.70	0.98	1.01

- 2.5 Use of the L<sub>eq</sub> contour is internationally recognised as a means of noise measurement. A 66 dB(A) L<sub>eq16</sub> indicates that the average level of noise during a 16 hour day is 66 dB(A). 66 dB(A) is quieter than the a car traveling at 38mph, heard from about 21 feet away, or from a washing machine.
- 2.6 The 55 dB(A) contour, used in agreement with Rushmoor, is below that deemed to be the trigger of "low annoyance" in the Wilson Committee Report (1963), a report traditionally used as a method of assessing the probability of annoyance due to aircraft noise. According to research by Schultz on reaction to noise, 55dB(A) calculated as a DNL (Day Night Level) is likely to cause less than 5% of the community becoming highly annoyed.

- 2.7 The FAA's INM along with ANCONII has been produced to comply with the requirements of ECAC -CEAC Document 29 as specified in the proposed European Noise Directive.
- 2.8 In accordance with the requirements of the Section 106 Agreement TAG has purchased the latest version of INM (INM 7.0), which was released at the end of April 2007. At present this latest edition of INM cannot be used due to an incompatibility issue in relation to the INM Link Program (which allows actual aircraft tracks to be used in the modelling process). This issue has been raised with and acknowledged by the producers of INM (Brüel & Kjær). Brüel & Kjær have since confirmed that INM Link will not be upgraded to support INM 7 and this issue will therefore not be addressed until the next major release of the INM software.
- 2.9 Due to the circumstances stated above, TAG has used INM version 6.2 in the latest assessment to examine aircraft derived noise data. This version remains compatible with the INM Link Program allowing actual track data to be used to model Noise Contours based on aircraft movements. Brüel & Kjær have stated that following their evaluation, INM Version 6.2 gives the same results as INM Version 7 within the expected accuracies of the INM model and typical input data.
- 2.10 Daily  $L_{eq}$  Figures are given in Appendix A.

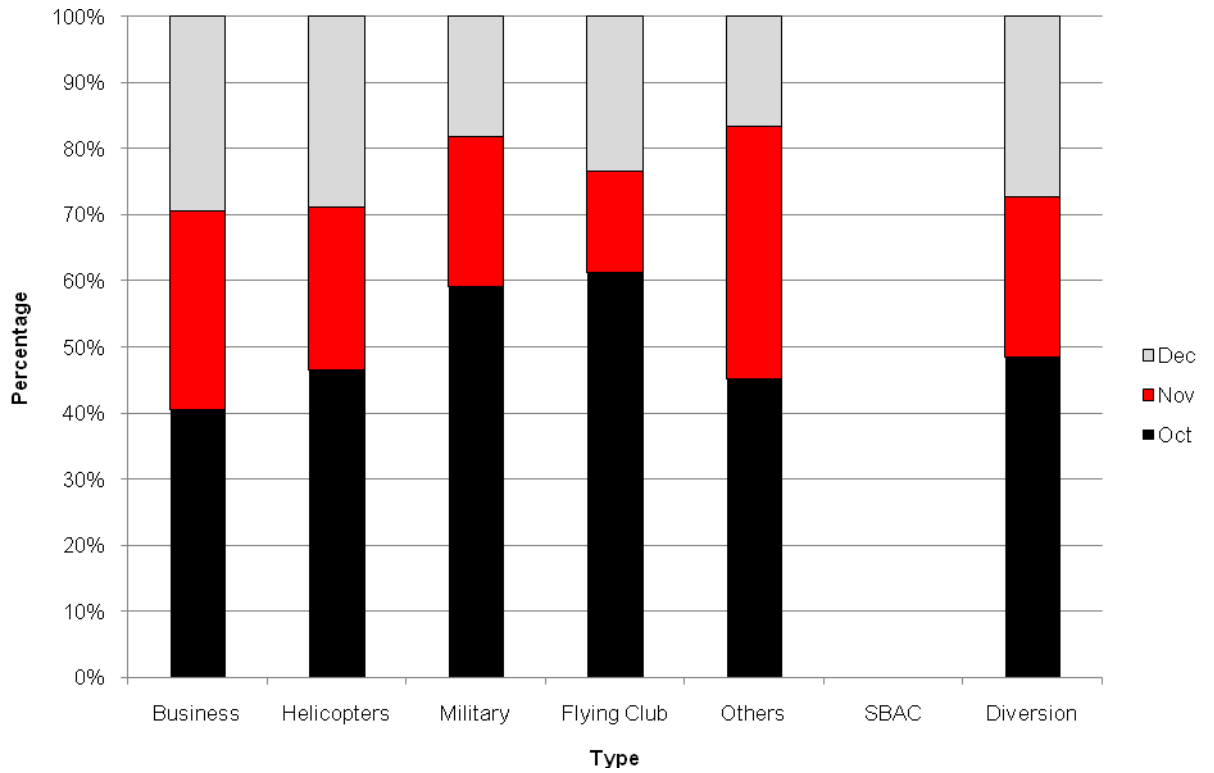
### 3. AIRCRAFT MOVEMENTS

- 3.1 Table 2 shows a summary of aircraft movements for the fourth quarter 2008 by movement category. Figure 4 gives a summary of movements by category for weekdays. Figure 5 gives a summary of movements by category for weekends.

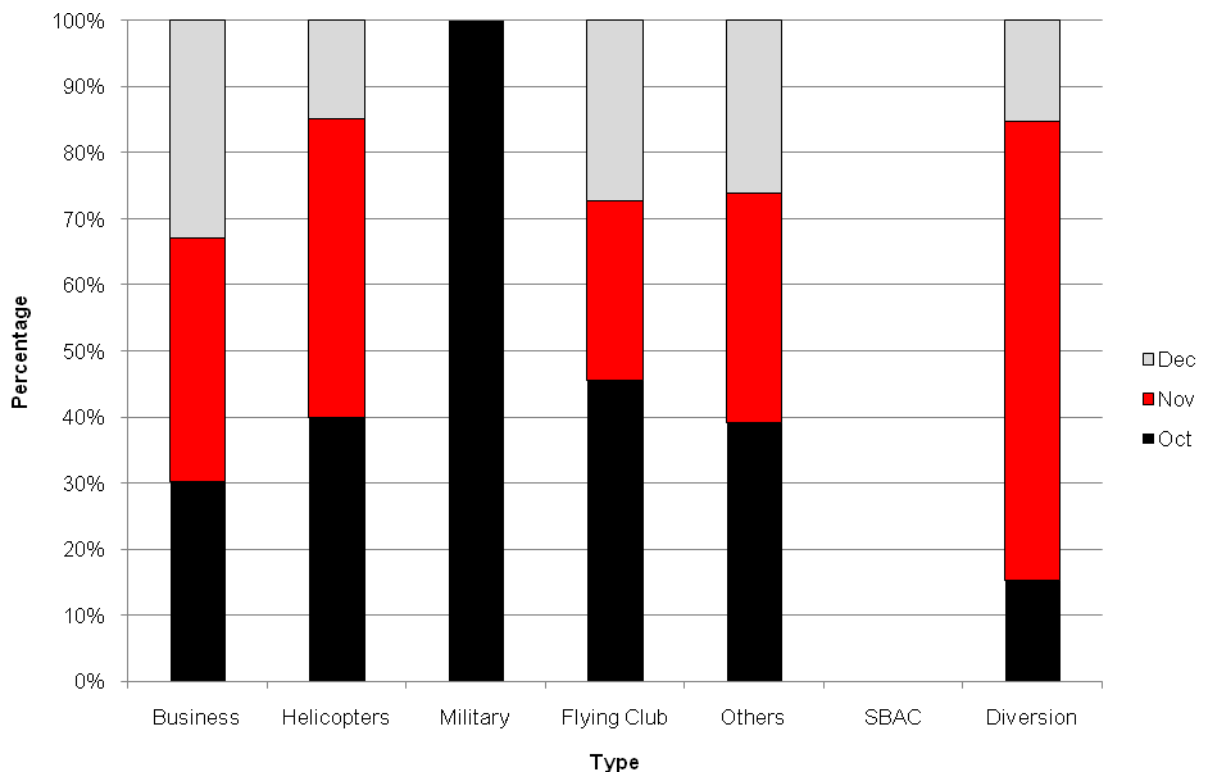
**Table 2: Movements summary by type.**

Category	October	November	December	Quarter 4, 2008	Total 2008
<b>Business</b>	1962	1587	1531	5080	24227
<b>Helicopter</b>	126	81	73	280	1277
<b>Subtotal (Planning Agreement Movements)</b>	2088	1668	1604	5360	25504
<b>Flying club</b>	86	25	35	146	571
<b>Military</b>	14	5	4	23	119
<b>Diversion</b>	18	17	11	46	123
<b>Other</b>	54	63	26	143	744
<b>SBAC</b>	0	0	0	0	885
<b>Total</b>	2260	1778	1680	5718	27946

**Figure 4: Percentage of Weekday Movements by Type, Quarter 4, 2008**

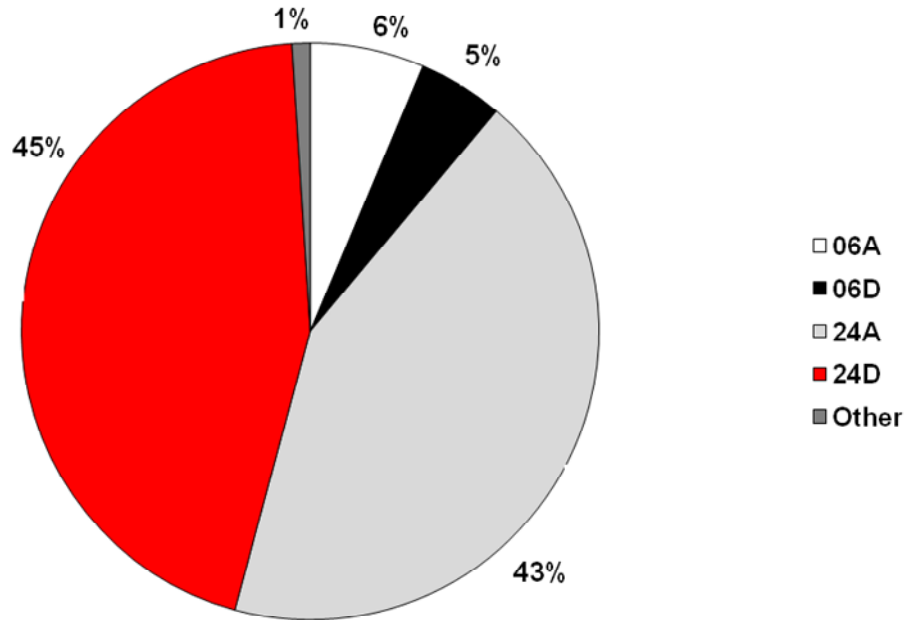


**Figure 5: Percentage of Weekend and Bank Holiday Movements by Type, Quarter 4, 2008.**

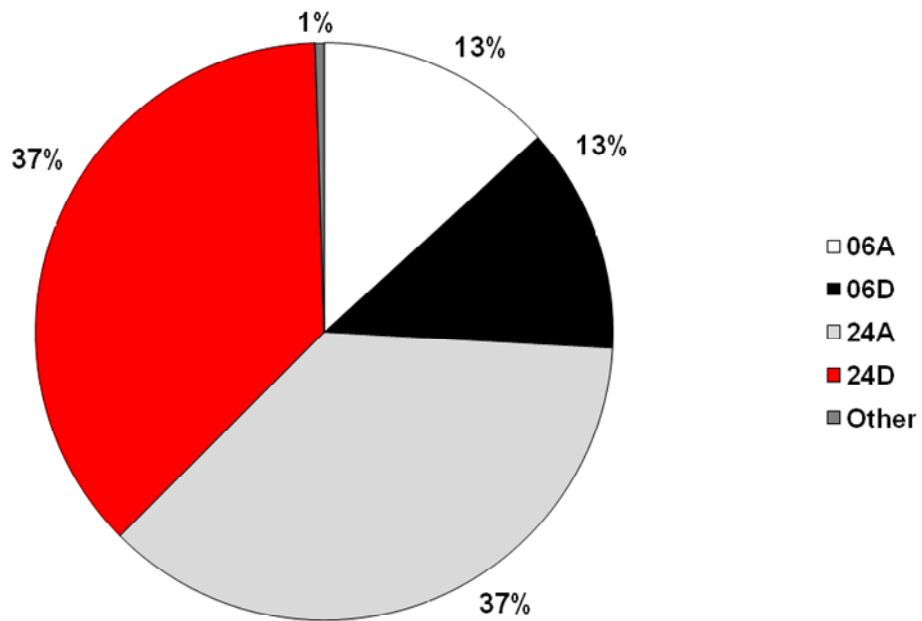


3.2 Figures 6, 7, 8 and 9 display information regarding runway use and operation. Operation refers to whether the movement was a Departure or an Arrival.

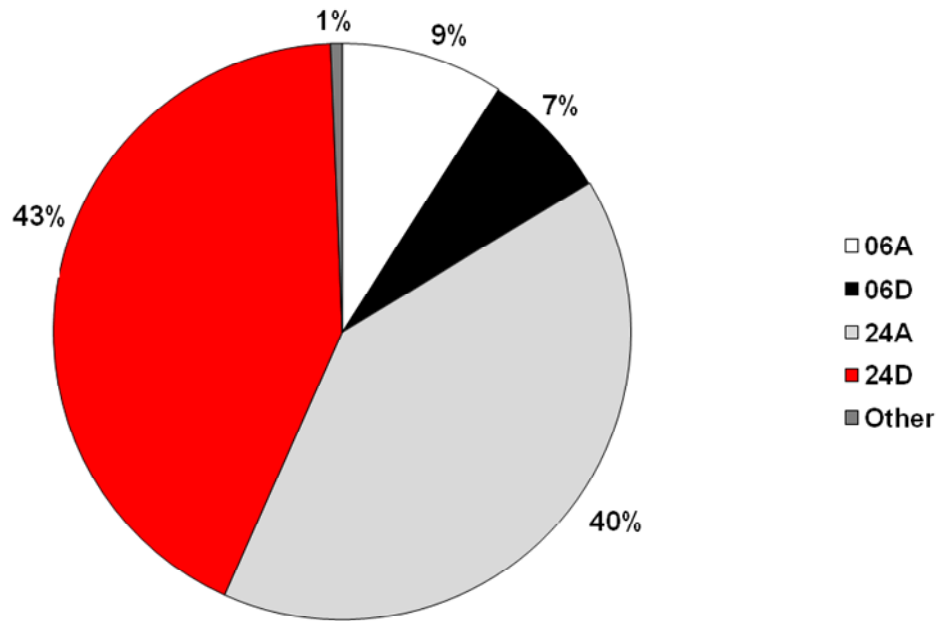
**Figure 6: Monthly Movements by Runway Used and Operation October 2008**  
 Key: A-Arrival, D-Departure, Other- Non runway traffic (helicopters)



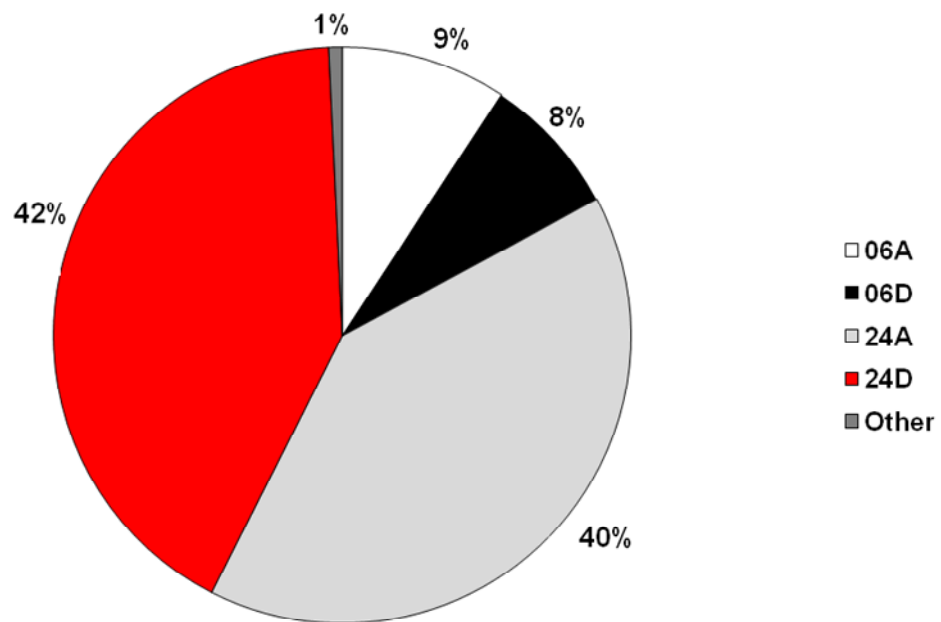
**Figure 7: Monthly Movements by Runway Used and Operation November 2008**  
 Key: A-Arrival, D-Departure, Other- Non runway traffic (helicopters)



**Figure 8: Monthly Movements by Runway Used and Operation December 2008**  
 Key: A-Arrival, D-Departure, Other- Non runway traffic (helicopters)



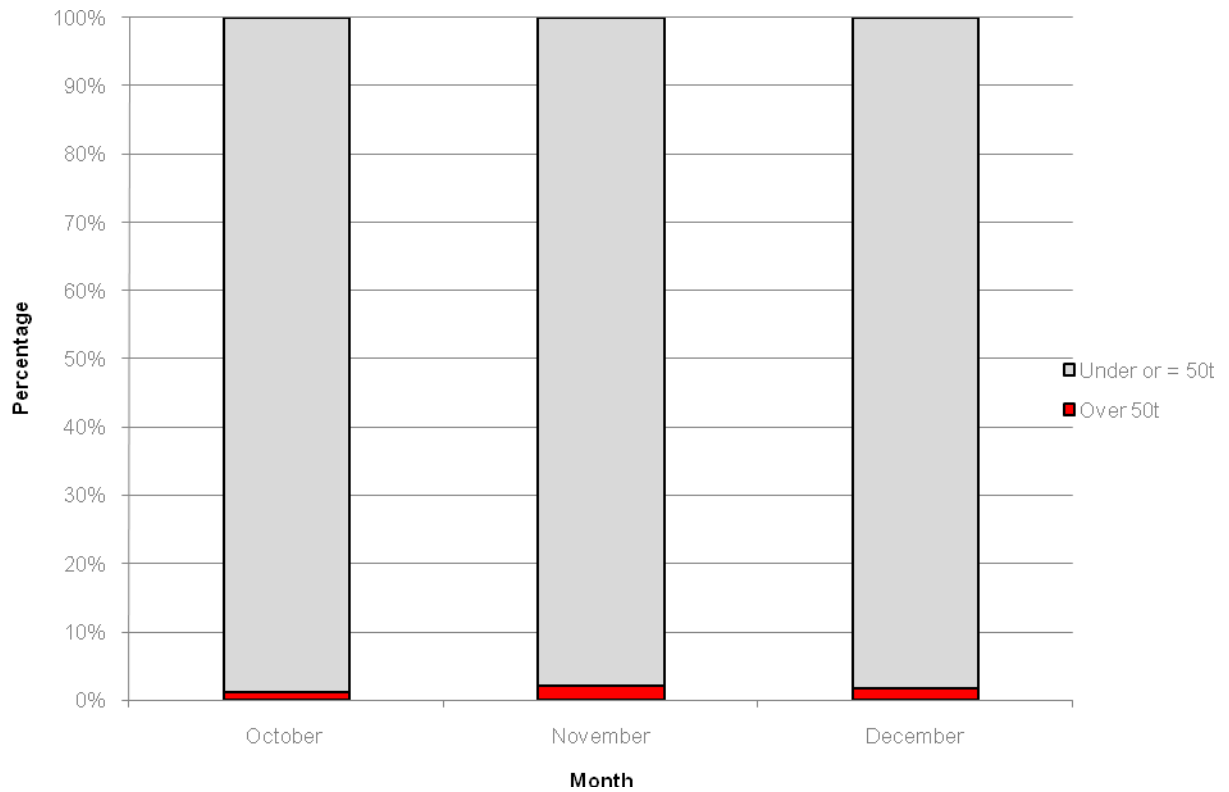
**Figure 9: Overall runway usage split for Quarter 4, October– December 2008**  
 Key: A-Arrival, D-Departure, Other- Non runway traffic (helicopters)





3.3 Maximum Take-Off Weight (MTOW) is recorded for all operating aircraft. Figure 10 gives a summary of the MTOW of aircraft operated during each month of the fourth quarter of 2008.

**Figure 10: Number of movements by Maximum Take-Off Weight (MTOW), Quarter 4, 2008**



3.4 All civil aircraft using Farnborough during the fourth quarter were compliant with the International Civil Aviation Organisation (ICAO) Chapter 3 classification. Chapter classifications are calculated from aircraft noise measurements made during take-off and landing. The results of monitoring exercises are expressed as a function of aircraft mass and number of engines. All measurements are required to be below the certified noise levels in order to comply with that certification standard. Aircraft not compliant with an ICAO standard may be fitted with “hushkits” (have their original engines adjusted or replaced to comply with the required standard).

3.5 A new more stringent ICAO standard, ICAO Chapter 4 has been finalised with all aircraft manufactured from the beginning of 2006 being built to Chapter 4 specifications or above. The new classification requires aircraft noise performance, as measured by manufacturers, to fall by 10dB (A) below that required by Chapter 3.

Helicopters, light aircraft and military aircraft are not subject to the requirements of the ICAO noise certification scheme.

## 4. AIR QUALITY MONITORING

- 4.1 The locations of the thirteen nitrogen oxide diffusion tubes and the two Learian Streetbox monitors remain as previously reported. To see details of the locations of the monitors please refer to previous reports before the first quarter of 2005. Table 3 displays the standards accepted by the Government and recommended by the expert panel on air quality standards.

**Table 3: Objectives to be included in regulations for the purposes of local Air Quality Management**

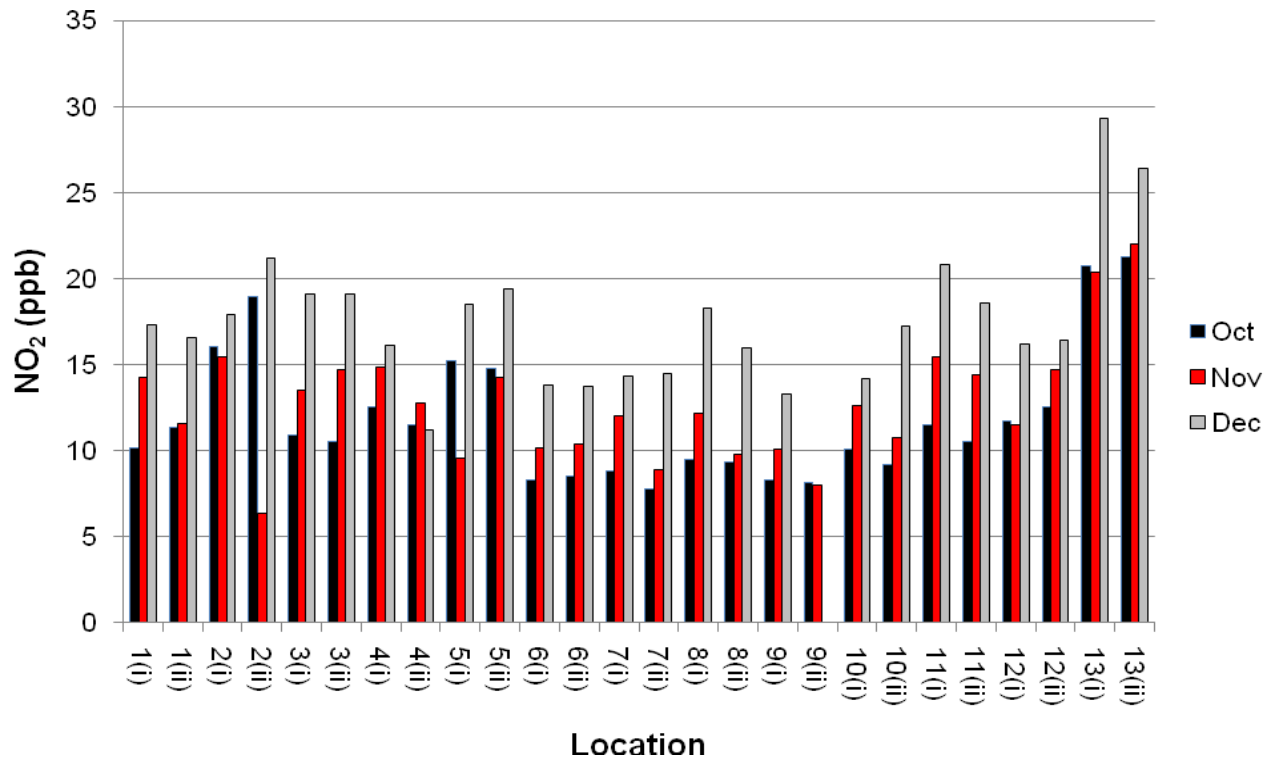
Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen Dioxide	200 $\mu\text{g}/\text{m}^3$ (105ppb) not to be exceeded more than 18 times a year	1 hour mean	31 <sup>st</sup> Dec 2005
Nitrogen Dioxide	40 $\mu\text{g}/\text{m}^3$ (21ppb)	annual mean	31 <sup>st</sup> Dec 2005

<sup>a</sup>Conversions of ppb and ppm to  $\mu\text{g}/\text{m}^3$  and  $\text{mg}/\text{m}^3$  at 20°C and 1013mb. ppb = parts per billion;  $\mu\text{g}/\text{m}^3$  = microgrammes per cubic metre.

Source: *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*. Department for the Environment, Food and Rural Affairs in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland, 2000.

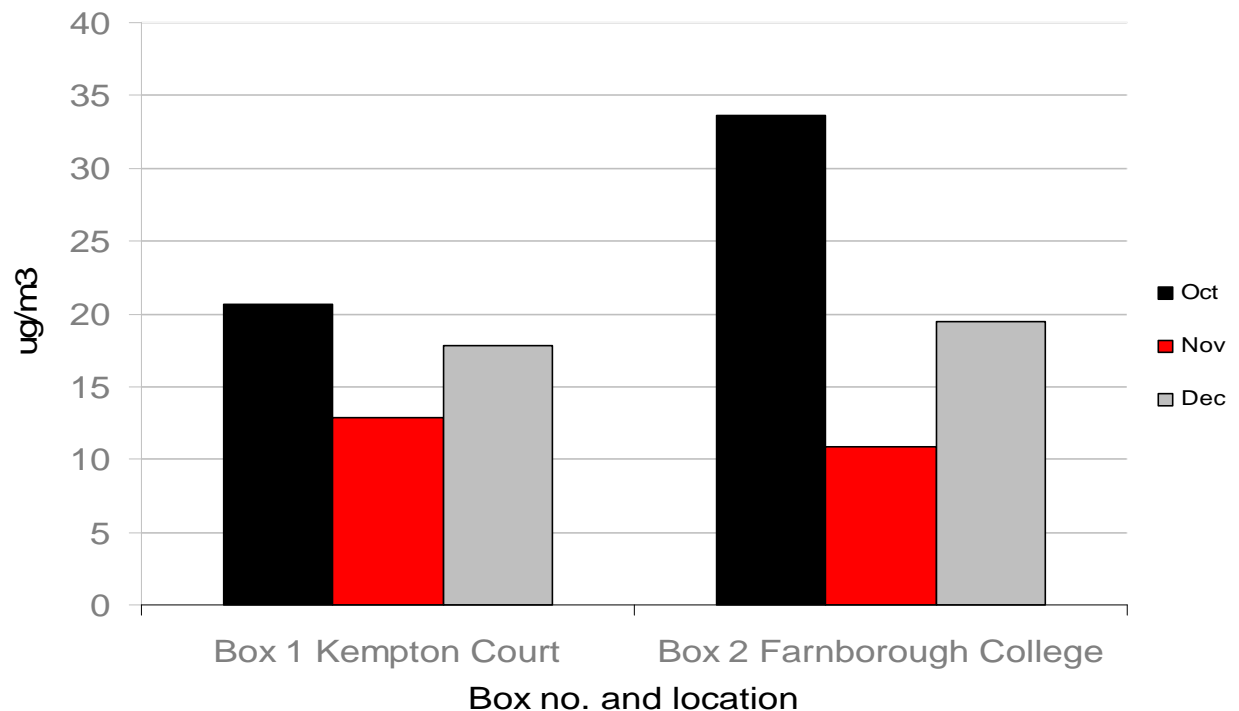
- 4.2 The results of the air quality survey consist of both raw and manipulated data taken from the diffusion tube laboratory analysis. The raw data taken from the Learian Streetbox Monitors consists of hourly mean concentrations of NO<sub>2</sub>. As this data is extensive when covering a three-month period, it has been displayed as monthly means for the purpose of this report.
- 4.3 The results of both the passive and active NO<sub>2</sub> monitoring are detailed in Figures 11 and 12.

**Figure 11: NO<sub>2</sub> Diffusion Tube Results Quarter 4, 2008**



*N.B. ppb - parts per billion expressed as a monthly mean. This data has not had a bias adjustment applied*

**Figure 12: NO<sub>2</sub> concentrations as recorded by Learian Streetbox Monitors, Quarter 4, 2008**



*N.B. ug/m3 expressed as a monthly mean*

- 4.4 The results taken from the diffusion tubes indicate that NO<sub>2</sub> levels around the airfield during quarter 4, on average, have achieved the objectives to be included in the regulations for the purpose of Air Quality Management. Whilst levels recorded by the monitoring network continued to remain well below the accepted levels stated in Table 4 during the fourth quarter of 2008, increases in ambient NO<sub>2</sub> levels were apparent during this period. The elevated readings were however not confined to the monitoring stations around the Airport perimeter and were in fact seen at all 13 locations including the monitoring station at Church Crookham (Bank 6) which is most commonly up wind from the airfield. October to December was also the least busy quarter of the entire year in terms of air traffic movements at the airport and therefore with these combined factors, it is most likely that the increased readings resulted from the meteorological conditions that prevailed at the time and the increased levels of seasonal decomposition.
- 4.5 Continuing trends in the results obtained appear to indicate terrestrial sources of NO<sub>2</sub> as the predominate source. The elevated levels consistently recorded for location 13 adjacent to the M3 motorway illustrate this. Location 13 lies within Rushmoor's Air Quality Management Area (AQMA), declared for nitrogen dioxide.

## **5. CONCLUSION**

- 5.1 Routine monitoring of compliance with noise abatement routes, air quality targets, and aircraft movement quotas continues at the airport. To date, all environmental monitoring undertaken has been implemented in accordance with the regulatory requirements and those of the Town and Country Planning Act Section 106 Agreement.
- 5.2 All movements operated at the airport are restricted to those permitted by the terms of the planning consent and the accompanying agreement.
- 5.3 Nitrogen dioxide levels recorded by monitoring stations remain consistent with previously noted trends. Nitrogen dioxide levels are naturally elevated over the colder winter months compared with results obtained during the summer; this is as a result of the release of nitrates from the soils and decomposition processes.
- 5.4 The activities at the airport remain within those required by the Section 106/299A agreement.

Created by: Miles H Thomas and Helena May, 27/01/2009  
Environment Manager / Assistant [www.tagfarnborough.com](http://www.tagfarnborough.com)

**Appendix A.**

## Noise Data Report (Total), Quarter 4

From 01/10/2008 to 31/12/2008



**Farnborough  
Airport**

### Oct-08

Leq (Total) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	55.1	53.1	52.6	58.7	53.7	53.0	54.2	54.0	53.0	53.9	49.9	50.5	56.8	71.8	53.4	54.8	68.3	70.0	69.1	56.2	52.9	55.3	57.3	53.2	70.5	56.5	54.1	52.0	53.7	52.7	54.7
3	58.3	57.3	55.5	56.1	53.5	57.7	58.1	55.8	56.5	57.5	52.1	53.7	58.3	56.3	58.1	59.5	56.3	53.2	54.6	58.4	56.3	57.5	58.7	55.7	56.3	55.3	62.9	54.0	55.2	55.7	56.9

### Nov-08

Leq (Total) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2	53.1	48.5	52.6	50.6	53.0	52.7	53.5	54.9	64.4	57.7	54.9	52.8	53.0	52.2	50.8	49.7	53.4	53.9	52.8	53.6	54.3	50.8	52.0	55.8	52.0	53.2	54.0	52.7	49.5	53.0
3	54.8	56.3	55.1	57.2	59.6	56.4	58.6	58.1	58.1	57.8	57.5	56.4	57.3	56.9	54.0	55.0	58.1	57.0	56.3	57.8	56.9	53.4	56.7	57.4	55.1	56.3	57.2	57.6	55.1	55.0

### Dec-08

Leq (Total) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	53.5	53.2	53.7	55.3	57.1	51.9	57.7	53.1	53.1	55.3	53.9	55.4	55.9	51.0	51.8	51.8	54.0	53.8	54.6	52.7	51.7	51.7	50.4	49.7	46.6	49.3	58.4	50.2	48.4	48.3	45.7
3	55.8	56.3	56.6	57.9	58.0	52.5	54.4	57.0	55.9	56.9	55.9	58.2	55.3	55.1	55.8	55.3	56.9	57.1	57.1	55.6	53.9	54.6	54.7	52.5	45.5	48.8	53.0	52.2	52.0	52.0	50.9

## Noise Data Report (Event), Quarter 4

From 01/10/2008 to 31/12/2008



**Farnborough  
Airport**

### Oct-08

Leq (Event) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	50.5	50.8	50.2	56.9	49.4	50.5	50.7	52.2	50.0	50.4	42.1	45.5	48.9	70.8	50.8	53.2	65.2	66.8	66.4	52.5	49.6	51.8	54.4	50.4	64.4	54.1	51.1	47.7	51.4	49.5	52.2
3	55.5	55.4	51.5	50.4	49.8	56.0	56.0	52.7	53.8	55.8	48.7	51.7	57.1	54.1	56.6	58.1	53.8	49.8	51.9	55.9	53.5	55.1	55.9	52.6	53.4	52.7	61.3	51.0	52.3	52.6	53.9

### Nov-08

Leq (Event) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2	48.9	45.7	49.9	47.4	50.8	50.4	49.0	50.8	63.5	55.2	49.0	49.9	49.5	48.2	45.5	46.3	50.2	52.3	49.5	51.4	52.0	47.7	48.0	53.3	48.7	50.2	50.3	50.4	46.7	47.8
3	46.1	54.3	51.5	55.9	53.9	54.5	55.6	52.4	53.4	54.3	54.4	53.8	54.7	54.8	51.1	53.7	55.2	54.3	53.1	55.8	53.1	49.9	54.8	54.8	51.0	53.7	54.3	56.1	53.6	52.8

### Dec-08

Leq (Event) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	51.1	48.8	51.6	51.1	50.9	48.8	55.8	48.1	50.7	53.8	51.5	51.8	52.2	48.7	49.7	48.0	51.3	50.1	49.4	48.2	43.1	48.0	46.4	46.5	33.5	34.4	55.8	43.5	43.6	43.3	38.6
3	52.4	52.8	54.0	54.7	55.8	46.3	51.8	53.3	52.5	54.2	52.9	55.3	50.5	53.6	53.7	52.4	54.1	54.4	54.2	52.4	50.9	52.5	52.5	49.9	0.0	0.0	48.9	49.0	46.9	47.6	46.4

## Noise Data Report (Background), Quarter 4

From 01/10/2008 to 31/12/2008



**Farnborough  
Airport**

### Oct-08

Leq (Background) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	53.2	49.4	49.1	54.8	51.8	49.5	51.7	49.5	50.2	51.5	49.1	49.0	56.1	68.5	50.0	50.0	66.7	68.9	67.9	54.0	50.3	52.8	54.5	50.0	69.7	53.1	51.2	50.1	50.0	50.0	51.3
3	55.2	52.8	53.2	54.7	51.2	53.0	53.8	52.8	53.1	52.8	49.4	49.4	52.1	52.3	52.9	53.9	52.7	50.6	51.2	54.7	53.0	53.7	55.4	52.8	53.2	52.0	58.3	50.9	52.2	52.8	54.0

### Nov-08

Leq (Background) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2	51.0	45.4	49.2	47.8	49.0	48.9	51.6	52.9	59.1	54.6	53.6	49.8	50.4	50.1	49.2	47.0	50.5	48.7	50.1	49.5	50.4	47.9	50.0	52.6	49.3	50.4	51.7	48.9	46.3	51.6
3	54.2	52.0	52.7	51.4	58.3	51.9	55.6	56.7	56.3	55.3	54.6	52.9	53.8	52.7	50.8	48.9	55.0	53.8	53.4	53.5	54.5	50.8	52.3	54.1	53.0	53.0	54.1	52.3	49.9	51.1

### Dec-08

Leq (Background) by Day of Month (by NMT)

NMT / DAY

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	49.8	51.3	49.8	53.4	56.0	48.9	53.3	51.4	49.5	49.9	50.2	53.0	53.6	47.1	47.6	49.5	50.8	51.5	53.1	50.8	51.1	49.2	48.1	46.8	46.3	49.1	54.9	49.2	46.7	46.7	44.7
3	53.2	53.7	53.3	55.2	54.0	51.4	51.0	54.5	53.3	53.6	52.9	55.0	53.6	49.6	51.7	52.3	53.6	53.9	53.9	52.8	50.9	50.5	50.7	49.0	45.5	48.8	50.9	49.4	50.4	50.1	48.9