

Short Term Monitoring Program NSW, Concord Report

February 2013

Version Control

| Version Number | Date | Detail |
|----------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 1.0 | February 2013 | Initial Release. |
| 2.0 | May 2013 | Updated EMU Height. Updated table 2 for minimum, maximum and average heights. Updated formatting for table 2, figure 5 and table 4. |
| 3.0 | January 2014 | Figure 5 and L90 values updated due to technical issue. |
| | | |

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This report contains a summary of data collected over the specified period and is intended to convey the best information available from the NFPMS at the time. The system databases are to some extent dependent upon external sources and errors may occur. All care is taken in preparation of the report but its complete accuracy can not be guaranteed. Airservices Australia does not accept any legal liability for any losses arising from reliance upon data in this report which may be found to be inaccurate.

Deployment Purpose – Concord, NSW

Following recommendations made in the 'Review of the Sydney Environmental Monitoring Units' undertaken by Airservices in 2012, Concord was selected as a Short Term Monitoring Location.

Jet departures off the north/south runway 34 Left traverse the suburb of Concord.

The purpose of this report is to provide a technical summary of the recorded aircraft noise and operational data collected at Concord over a four week period.

An explanation of terms used within this report can be found in the Glossary at the end of the report.

Monitoring Period

22/10/2012 12:00pm – 19/11/2012 12:00pm

Environmental Monitoring Unit (EMU) Details

| | |
|--------------------|------------------------------------------------------------------------------|
| Location | Stanley Street, Concord 2137 |
| Latitude | 33°51'52.88"S |
| Longitude | 151°6'28.08"E |
| Capture Zone | 2.5km radius with 8,021ft (above ground level) height for noise data capture |
| EMU Altitude | 44ft above mean sea level |
| Threshold Settings | 56.0 dB(A) to 59.0 dB(A) depending on time of day |

Location Images

Figures 1 to 3 details the location of monitors surrounding Sydney Airport and the flight paths used for those operations captured by the Concord EMU.

Figure 1 Sydney Fixed Environmental Monitoring Unit Locations and the Concord Short Term Monitoring Program Deployment Location



Figure 2 Total Movements Captured

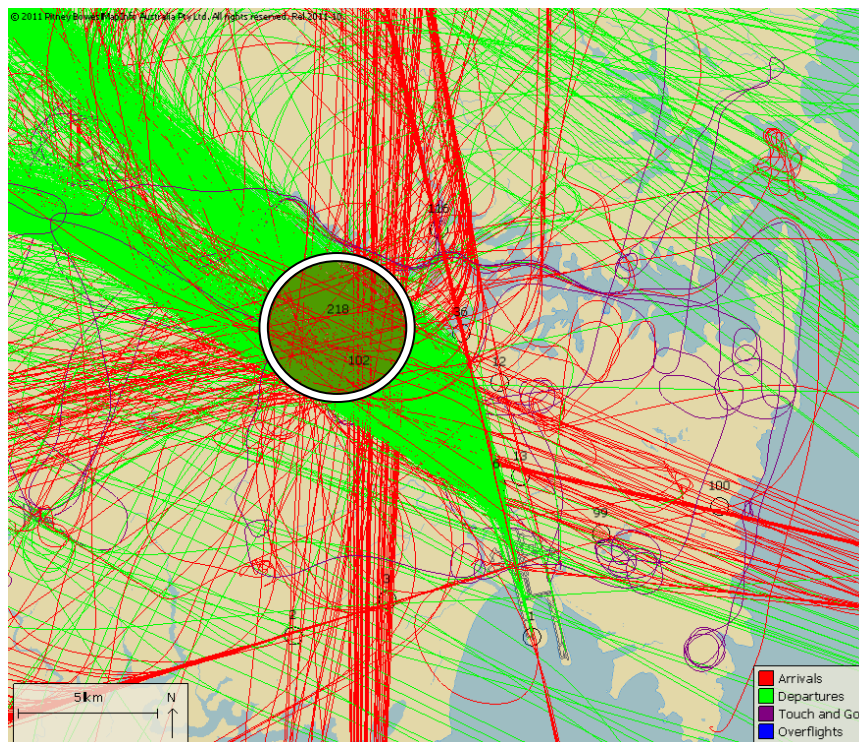


Figure 3 Sydney Airport Jet Runway 34 Left Departures

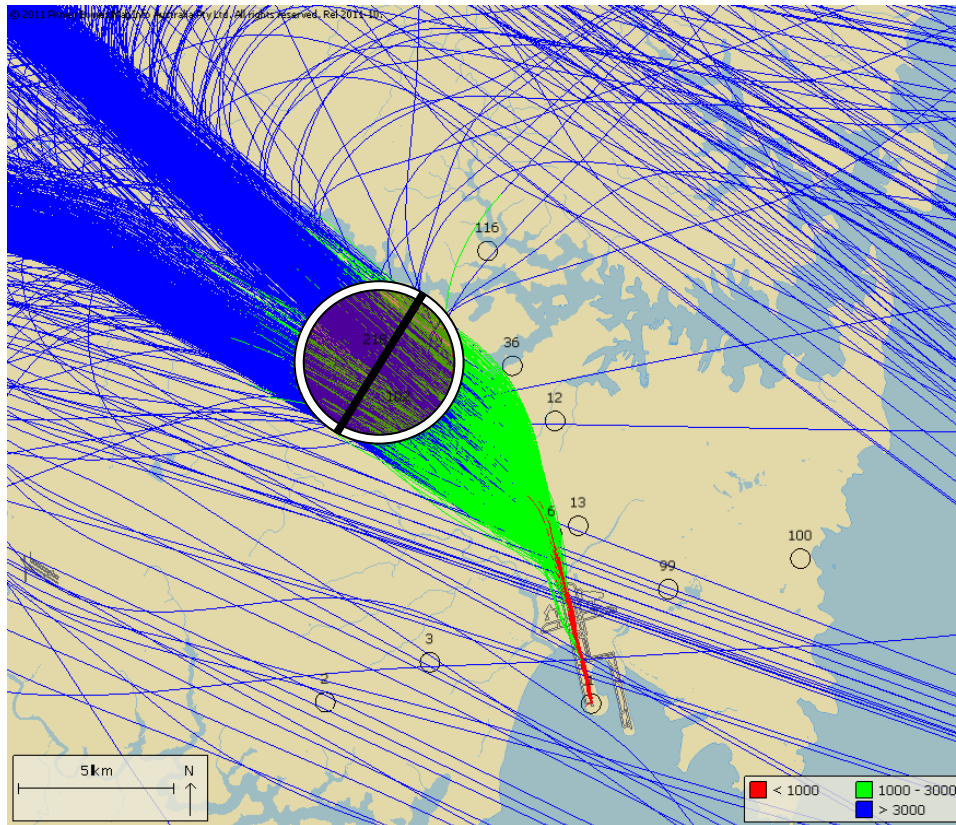
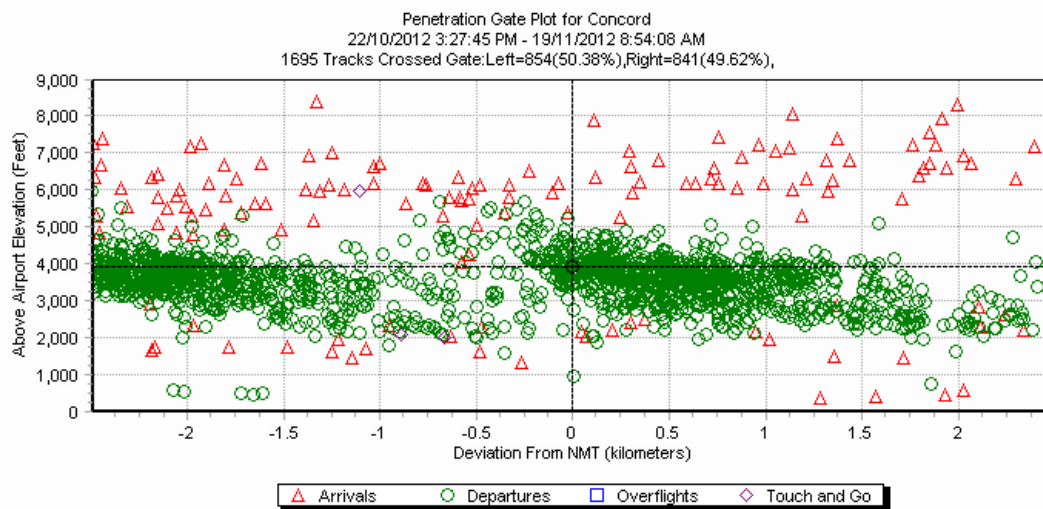


Figure 4 Concord Movements Through Capture Zone Penetration Gate



Note: Sydney Airport altitude is 21ft above mean sea level. EMU altitude is 44ft above mean sea level. The EMU altitude should be adjusted from the data shown above in order to draw conclusions about height above ground of aircraft operations.

The black line through the capture zone in Figure 3 depicts the penetration gate location for the plot shown in Figure 4. Some movements through the capture zone failed to penetrate the gate used for analysis due to their entry and exit point through the capture zone. In addition, a single operation may fly through the penetration gate on multiple occasions. Further, operations that are on climb may pass out of the correlation zone and later penetrate the gate at a higher altitude. The opposite is true for arrivals that will penetrate the gate at a higher altitude and later pass through the correlation zone.

Findings

Table 1 Movement Summary (22/10/2012 12:00pm – 19/11/2012 12:00pm)

| Type of Operation | Jet Runway 34L Departures | All Movements |
|---------------------------------------------------------------|------------------------------|---------------|
| <i>Number of Movements Through Capture Zone*</i> | 1,509 | 1,755 |
| <i>Number of Movements with Correlated Noise Events (CNE)</i> | 1,165 | 1,213 |
| <i>Correlation Summary</i> | 77.20% | 69.12% |

* Includes all aircraft with transponder flying through area, regardless of destination/origin airport.

Table 2 Height Above The Monitor Summary

| Type of Operation | Min* | Max* | Average* |
|----------------------------------------------|------|--------|----------|
| <i>Departures Through Capture Zone**</i> | 447 | 12,051 | 3,518 |
| <i>Arrivals Through Capture Zone**</i> | 357 | 8,385 | 5,179 |
| <i>All Operations Through Capture Zone**</i> | 357 | 12,051 | 3,658 |

* Flight tracks are susceptible to an altitude error of up to 200ft which is consistent with normal radar tolerances.

** Includes all airports within Sydney Basin.

Figure 4 shows jet departures typically fly at an altitude of 2,000 to 6,000 feet.

Table 3 Captured Movements Breakdown By Airport and Aircraft Category

| Airport | Jet | Turboprop | Light Propeller | Helicopter | Unknown* | Grand Total |
|--------------------|-------------|-----------|-----------------|------------|----------|-------------|
| <i>Sydney</i> | 1656 | 64 | 0 | 4 | 0 | 1724 |
| <i>Bankstown</i> | 0 | 1 | 1 | 3 | 4 | 9 |
| <i>Other</i> | 0 | 0 | 1 | 17 | 4 | 22 |
| Grand Total | 1656 | 65 | 2 | 24 | 8 | 1755 |

*These non-flight planned operations are generally recreational aircraft conducting private flights and will account for the very low altitudes by some aircraft.

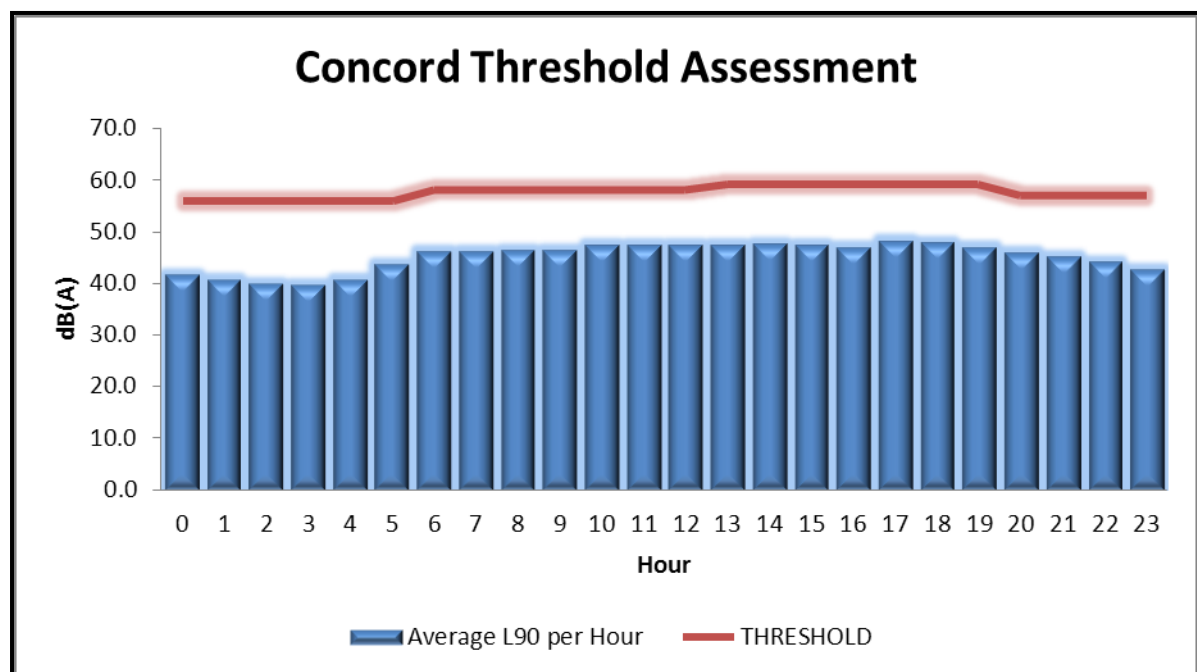
Correlation Summary

An evaluation of the number of aircraft operations that were matched with noise events recorded by the EMU is an important aspect of assessing performance of the noise monitoring installation. Ideally, all operations passing the EMU within a reasonable proximity will be matched to the appropriate noise event. Whilst complete matching is not expected, a lack of matches will reveal the need to investigate the reason for anomalies. The correlation results for the Concord EMU are shown in Table 1. A correlation summary for all movements of 69% is a reasonable result considering the diversity of flight paths over the monitor.

Background Noise Levels and Threshold Settings

At the monitoring site, background noise levels are first assessed to determine the appropriate threshold settings for the noise monitor. The threshold setting must be above the background noise level in order to clearly distinguish aircraft noise events from other noise sources. The result of background noise assessment and threshold settings are provided below in Figure 5.

Figure 5 Background and Threshold Assessment



Noise Summary

The following tables present a summary of the noise data for aircraft that flew through the capture zone and caused a Correlated Noise Event (CNE). Information is provided for those jet aircraft that flew over the EMU and departed off Runway 34 Left, as well as all aircraft that flew over the EMU, noting that this area is affected by arrivals, departures and training flights, as shown in Figure 2 and Figure 3.

Table 4 Noise Summary

| NOISE PARAMETERS | |
|-------------------------------------------|------|
| L _{Aeq} 24 hr, dBA | 55.9 |
| L _{Aeq} (night), dBA | 46.7 |
| Background Day (L ₉₀ dBA) | 46.7 |
| Background Night (L ₉₀ dBA) | 41.2 |

Table 5 Correlated Noise Events Summary

| | Jet Runway 34L Departures | All Aircraft |
|-------------------------------------------------------------------------------------|------------------------------|------------------------|
| Total number of Correlated Noise Events (CNE 24hr) | 1165 | 1213 |
| Number of Correlated Noise Events at night (CNE night) | 0 | 15 |
| Operational Days | 28.0 | 28.0 |
| | | |
| Number of Correlated Noise Events (CNE _{xx}) day/night | CNE _{xx} | CNE _{xx} |
| CNE ₆₀ – day | 1164 | 1195 |
| CNE ₆₀ - night | 0 | 14 |
| CNE ₆₅ – day | 1069 | 1083 |
| CNE ₆₅ – night | 0 | 7 |
| CNE ₇₀ – day | 630 | 638 |
| CNE ₇₀ - night | 0 | 0 |
| CNE ₇₅ – day | 150 | 154 |
| CNE ₇₅ - night | 0 | 0 |
| CNE ₈₀ – day | 13 | 13 |
| CNE ₈₀ - night | 0 | 0 |
| | | |
| Number of Correlated Noise Events (CNE _{xx}) per 24hr period min – max | | |
| CNE ₆₀ | 0 to 88 | 1 to 90 |
| CNE ₆₅ | 0 to 83 | 0 to 83 |
| CNE ₇₀ | 0 to 57 | 0 to 57 |
| CNE ₇₅ | 0 to 17 | 0 to 17 |
| CNE ₈₀ | 0 to 2 | 0 to 2 |
| | | |
| Average Number of Correlated Noise Events (CNE _{xx} Ave.) day/night | CNE _{xx} Ave. | CNE _{xx} Ave. |
| CNE ₆₀ Ave. – day | 41.57 | 42.68 |
| CNE ₆₀ Ave. – night | 0.00 | 0.50 |
| CNE ₆₅ Ave. – day | 38.18 | 38.68 |
| CNE ₆₅ Ave. – night | 0.00 | 0.25 |
| CNE ₇₀ Ave. – day | 22.50 | 22.79 |
| CNE ₇₀ Ave. – night | 0.00 | 0.00 |
| CNE ₇₅ Ave. – day | 5.36 | 5.50 |
| CNE ₇₅ Ave. – night | 0.00 | 0.00 |
| CNE ₈₀ Ave. – day | 0.46 | 0.46 |
| CNE ₈₀ Ave. – night | 0.00 | 0.00 |

Note: Day period is from 6:00am to 11:00pm. Night period is 11:00pm to 6:00am.

Table 6 LMax Summary

| Min dB(A) | Max dB(A) | Average dB(A) |
|-----------|-----------|---------------|
| 57.4 | 84.3 | 70.3 |

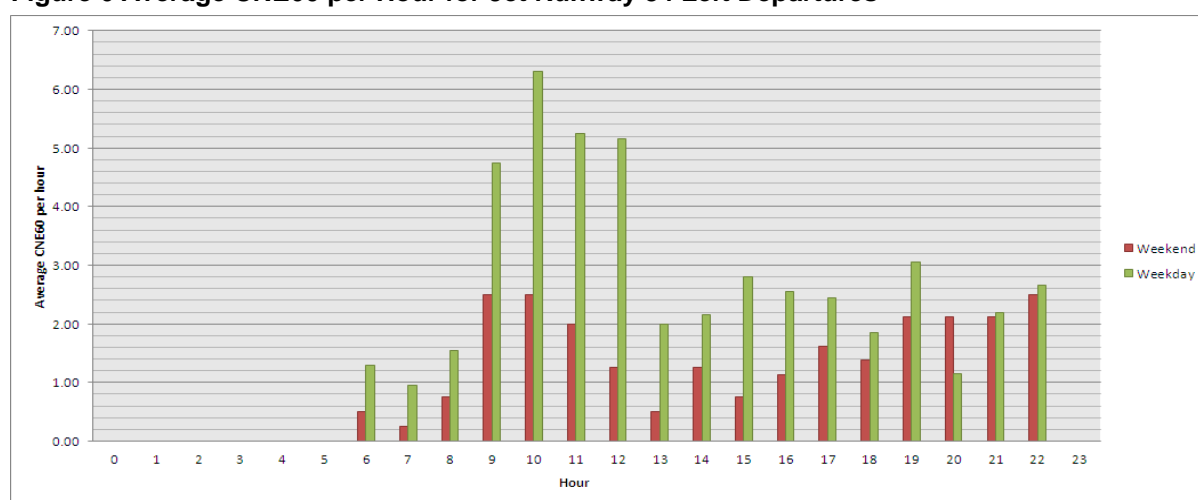
Note: Summary for operations that passed through the correlation zone (2.5km radius with 8,021ft height AGL)

CNE60 Count by Hour

A large number of noise events were between 60dB(A) and 70dB(A). Therefore further investigation was undertaken on the number of correlated noise events that exceed 60dB(A) to reveal patterns and determine what time of the day the majority of these events occurred.

Figure 5 presents daily average number of noise events 60dB(A) or above (CNE₆₀) broken down on an hourly basis.

Figure 6 Average CNE60 per Hour for Jet Runway 34 Left Departures



The highest number of CNE₆₀ in any one hour throughout the reporting period was 16 on the 5th November 2012 between 10am and 11am.

Aircraft Noise Levels

Table 7 presents the top 10 noisiest aircraft types captured by the noise monitor during the reporting period. Table 8 shows the 10 most correlated aircraft types that flew over the noise monitor.

Table 7 Top 10 Average Aircraft Noise Levels (LMax) at the Concord EMU

| Aircraft Type | Airport | Operation Type | Runway | No. Correlated Noise Events | LMax dB(A) | | Highest No. CNE in One Day |
|-------------------------|---------------------|----------------|--------|-----------------------------|------------|---------|----------------------------|
| | | | | | Average | Maximum | |
| Airbus A340-500 | Sydney | D | 34L | 3 | 76.3 | 77.7 | 1 |
| Robinson R44 | Sydney | T | H | 1 | 75.5 | 75.5 | 1 |
| Cessna 404 Titan | Bankstown | T | 29R | 3 | 75.4 | 78.3 | 3 |
| Unknown Helicopter | Parramatta Heliport | D | H | 1 | 74.6 | 74.6 | 1 |
| Boeing 747-800 | Sydney | D | 34L | 2 | 74.5 | 75.3 | 1 |
| Airbus A340-600 | Sydney | D | 34L | 30 | 74.0 | 80.5 | 3 |
| Boeing 747-400 | Sydney | D | 34L | 133 | 73.7 | 84.3 | 11 |
| McDonnell Douglas MD-11 | Sydney | D | 34L | 29 | 73.3 | 79.4 | 3 |
| Airbus A330-300 | Sydney | D | 34L | 172 | 72.4 | 80.2 | 15 |
| AgustaWestland AW139 | RPA Hospital | A | H | 1 | 72.2 | 72.2 | 1 |

Table 8 Top 10 Most Correlated Aircraft Types Over the Concord EMU

| Aircraft Type | Airport | Operation Type | Runway | No. Correlated Noise Events | L _A max dB(A) | | Highest No. CNE in One Day |
|-----------------|---------|----------------|--------|-----------------------------|--------------------------|---------|----------------------------|
| | | | | | Average | Maximum | |
| Boeing 737-800 | Sydney | D | 34L | 222 | 67.9 | 83.3 | 22 |
| Airbus A330-300 | Sydney | D | 34L | 172 | 72.4 | 80.2 | 15 |
| Airbus A330-200 | Sydney | D | 34L | 160 | 71.4 | 82.0 | 16 |
| Boeing 747-400 | Sydney | D | 34L | 133 | 73.7 | 84.3 | 11 |
| Airbus A320 | Sydney | D | 34L | 91 | 66.9 | 76.4 | 9 |
| Airbus A380 | Sydney | D | 34L | 70 | 71.5 | 82.8 | 6 |
| Boeing 777-300 | Sydney | D | 34L | 59 | 69.6 | 75.9 | 5 |
| Boeing 777-200 | Sydney | D | 34L | 50 | 70.6 | 75.6 | 5 |
| Boeing 767-300 | Sydney | D | 34L | 32 | 69.9 | 79.7 | 3 |
| Airbus A340-600 | Sydney | D | 34L | 30 | 74.0 | 80.5 | 3 |

Conclusions

Following recommendations made in 'Review of the Sydney Environmental Monitoring Units', Short Term Monitoring was conducted at Concord during the period of 22nd October to 19th November 2012. It was determined the most common aircraft movements to traverse the Concord community are jet departures operating from Sydney Airport. There were very few non-Sydney Airport movements that flew through the capture zone during the reporting period; these were predominately helicopter aircraft.

Throughout the reporting period the highest number of correlated aircraft noise events exceeding 60dB(A) in one day was 90. On November 5th, 16 events exceeding 60dB(A) occurred during 10am and 11am, this was the greatest number in one hour during the period. Residents in the area of Concord were exposed to noise events exceeding 75dB(A) during the hours of day. There were 14 correlated noise events above 60dB(A) that occurred during the hours of night. The average L_Amax during the reporting period was 70.3dB(A), with a max level of 84.3 dB(A) and minimum level of 57.4 dB(A) recorded.

Noise events above 60dB(A) were most common in the weekday hours of 9:00am to 1:00pm and on weekends in the periods of 9:00am to 12:00pm and 7:00pm to 11:00pm.

A review of Tables 7 and 8 indicates the most frequent and generally loudest common aircraft types to pass over Concord are Regular Public Transport (RPT) aircraft operating from Sydney Airport. Three helicopters created stand alone noise events during the reporting period placing them in the top 10 average aircraft noise levels. The Airbus A340-600, Airbus A330-300 and Boeing 747-400 feature in both the loudest average aircraft noise levels and most frequent aircraft types to fly over the Concord EMU.

The correlation summary is reasonable for this monitor considering the diversity and average height of the flight paths over the monitor.

Due to the distinctive flight paths and distance from Sydney Airport, it is not expected the ratio of arrival and departure flights over Concord from Sydney Airport will change due to seasonal variation over a twelve month period.

Further Information

Further information about Airservices noise monitoring program is available on the Airservices website, including reports of the noise and operational data collected by the Noise and Flight Path Monitoring System, as well as fact sheets about topics related to aircraft noise. The website is available at:

<http://www.airservicesaustralia.com/aircraftnoise/>

Contact us

To lodge a complaint or make an enquiry about aircraft operations, you can

- go to WebTrak (www.airservicesaustralia.com/aircraftnoise/webtrak/)
- use our online form (www.airservicesaustralia.com/aircraftnoise/about-making-a-complaint/)
- telephone 1800 802 584 (freecall) or 1300 302 240 (local call –Sydney)
- fax (02) 9556 6641 or
- write to, Noise Complaints and Information Service, PO Box 211, Mascot NSW 1460.

Glossary of Terms

| | |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| A | Arrivals |
| AGL | Above Ground Level |
| Background noise level (L90) | The sound level in dB(A) that is exceeded 90% of the time |
| CNE | Correlated noise events - noise events which are matched with aircraft movements |
| CNExx | Correlated noise events that are equal or greater than the noise level XX dB(A) |
| D | Departures |
| Day | 6:00am to 11:00pm |
| EMU | Environmental Monitoring Unit |
| H | Helicopters |
| Jet | Jet aircraft |
| LAeq | Continuous equivalent noise level over a time period |
| LAeq 24hr | Continuous equivalent noise level over a 24 hour period |
| LAeq night | Continuous equivalent noise level over the night time period (hours of 11:00pm to 6:00am) |
| LAmx | Maximum sound level in dB(A) |
| Local | Operation that departs and arrives at the same airport. Local movements include circuits and training flights. |
| Movement | An aircraft operation, such as a take-off or landing |
| Nxx | Average daily number of correlated noise events equal to or greater than XX dB(A) |
| Night | 11:00pm to 6:00am |
| NFPMS | Noise and Flight Path Monitoring System |
| Noise Event | A noise that exceeds the threshold sound level for longer than the threshold time that is set |
| Non-Jet | Non-jet aircraft |
| O | Overflight i.e. an aircraft movement that flew over the area but did not arrive or depart from the airport of concern |
| T | Local Operation (Departure & Arrival) |

Note:

For further information on the metrics used in this report refer to Australian Standard 1055.1–1997 “Acoustics – Description and measurement of environmental noise”.

Airservices welcomes comments about this report. Please contact us via e-mail at community.relations@airservicesaustralia.com if you would like to provide feedback.