

# **Short Term Monitoring Program NSW, Carlingford Report**

February 2013

## Version Control

Version Number	Date	Detail
1.0	February 2013	Initial Release.
2.0	May 2013	Updated formatting for table 2.
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 – Carlingford, NSW**

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

Both jet and turboprop arrivals onto the north/south runway 16 Right and departures off the reciprocal runway 34 Left traverse the suburb of Carlingford.

The purpose of this report is to provide a technical summary of the recorded aircraft noise and operational data collected at Carlingford 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**

23/10/2012 12:00pm – 20/11/2012 12:00pm

### **Environmental Monitoring Unit (EMU) Details**

Location	Karingal Avenue, Carlingford 2118
Latitude	33°46'51.61"S
Longitude	151°2'21.29"E
EMU Altitude	295ft above mean sea level
Capture Zone	2.5km radius with 7,726ft (above ground level) height for noise data capture
Threshold Settings	53.0 dB(A) to 54.0 dB(A) depending on time of day

### **Location Images**

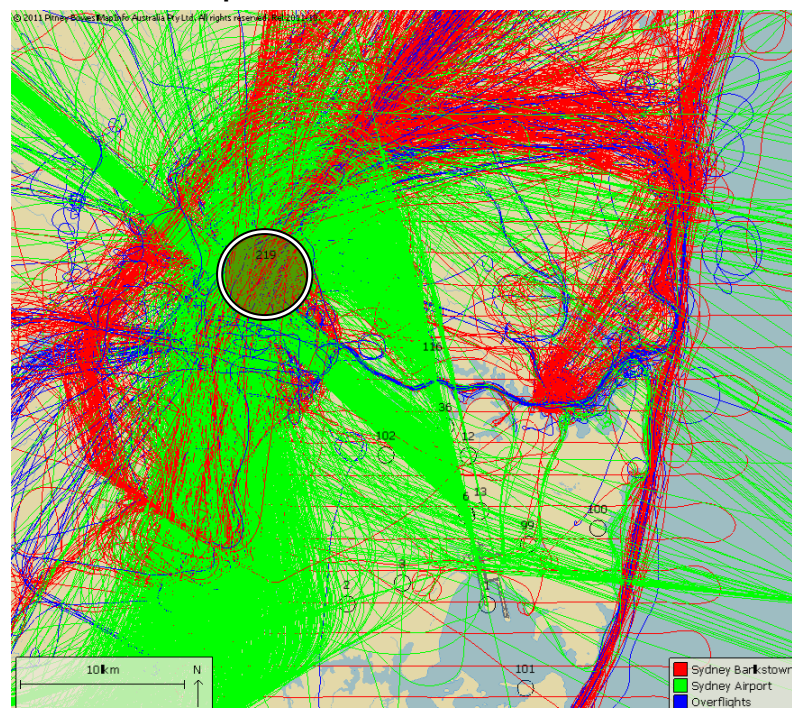
Figures 1 to 3 details the location of monitors surrounding Sydney Airport and the flight paths used for those operations captured by the Carlingford EMU.



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

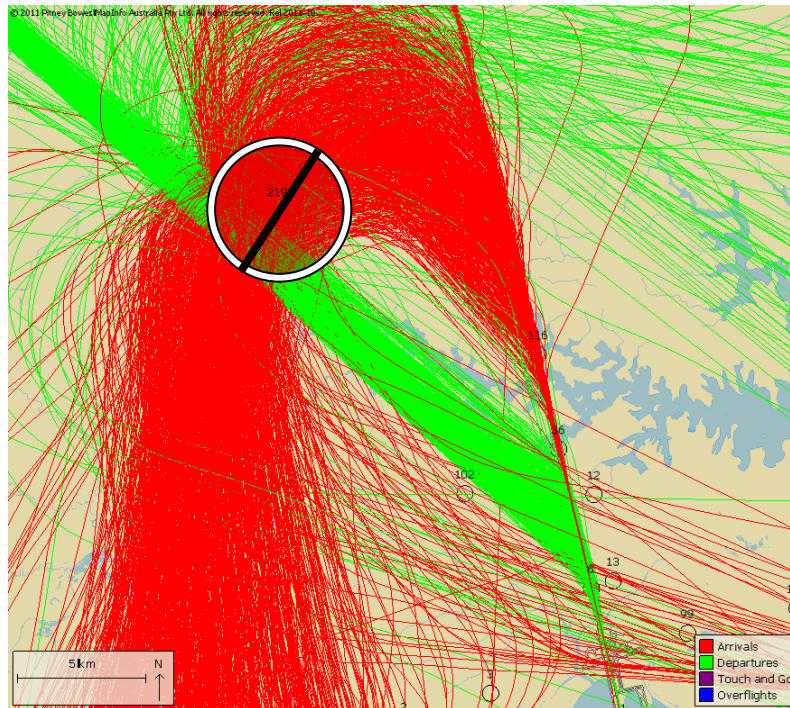


**Figure 2 Total Movements Captured**

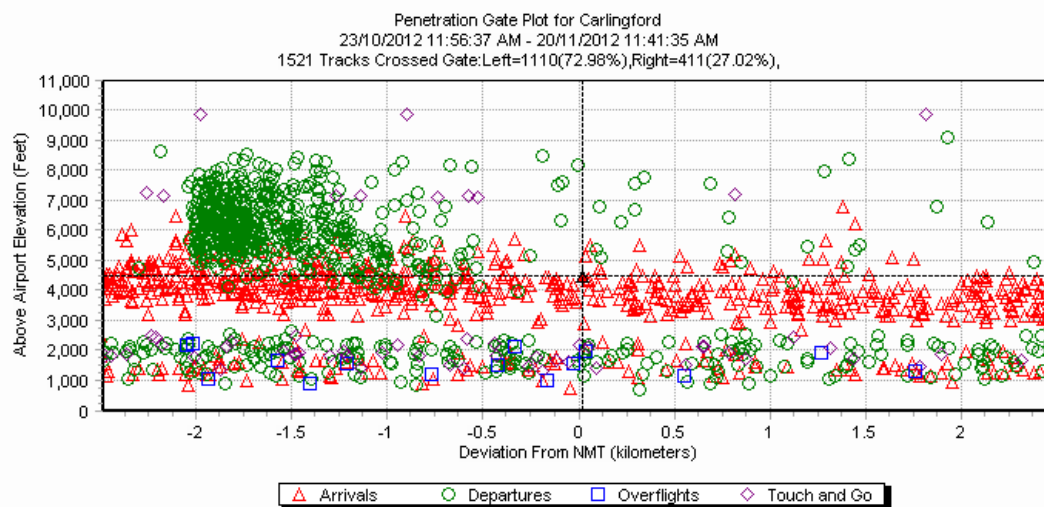




**Figure 3 Sydney Airport Runway 34 Left Departures and Runway 16 Right Arrivals**



**Figure 4 Carlingford Movements Through Capture Zone Penetration Gate**



Note: Sydney Airport altitude is 21ft above mean sea level. EMU altitude is 295ft 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

The following tables present a summary of the operations data.

**Table 1 Movement Summary (23/10/2012 12:00pm – 20/11/2012 12:00pm)**

Type of Operation	Jet Runway 16R Arrivals and 34L Departures	All Movements
<i>Number of Movements Through Capture Zone*</i>	1,650	2,770
<i>Number of Movements with Correlated Noise Events (CNE)</i>	862	1,759
<i>Correlation Summary</i>	52.24%	63.50%

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

**Table 2 Height (in feet, above ground level) Above The Monitor Summary**

Type of Operation	Min*	Max*	Average*
<i>Departures Through Capture Zone**</i>	418	8,826	4,656
<i>Arrivals Through Capture Zone**</i>	478	6,512	3,469
<i>All Operations Through Capture Zone**</i>	418	9,598	3,987

\* 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 that jet arrivals typically fly at an altitude of 3,000 to 6,000 feet, whilst jet departures are at 5,000 to 8,500 feet.

**Table 3 Captured Movements Breakdown By Airport and Aircraft Category**

Airport	Jet	Turboprop	Light Propeller	Helicopter	Unknown*	Grand Total
<i>Sydney</i>	1,679	364	0	18	0	<b>2,061</b>
<i>Bankstown</i>	0	32	71	20	421	<b>544</b>
<i>Parramatta Heliport</i>	0	0	0	5	45	<b>50</b>
<i>Unknown</i>	0	0	0	0	46	<b>46</b>
<i>Camden</i>	0	0	8	0	17	<b>25</b>
<i>Other</i>	1	0	1	4	38	<b>44</b>
<b>Grand Total</b>	<b>1,680</b>	<b>396</b>	<b>81</b>	<b>47</b>	<b>566</b>	<b>2,770</b>

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

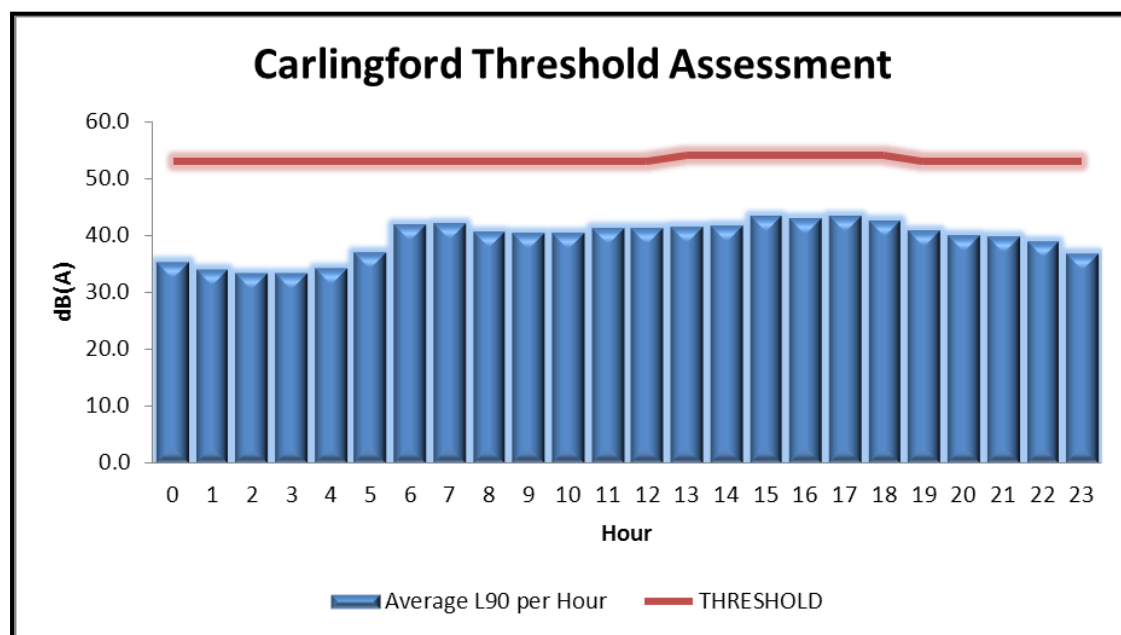
## Correlation Summary

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 Carlingford EMU are shown in Table 1. A correlation summary for all movements of 64% is a reasonable result considering the distance the monitor is located from the airport and 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 EMU. 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 arrived on Runway 16 Right or 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 <sub>Aeq</sub> 24 hr, dBA	50.8
L <sub>Aeq</sub> (night), dBA	42.5
Background Day (L <sub>90</sub> dBA)	41.3
Background Night (L <sub>90</sub> dBA)	34.8

**Table 5 Correlated Noise Events Summary**

	Jet Runway 16R Arrivals and 34L Departures	All Aircraft
Total number of Correlated Noise Events (CNE 24hr)	862	1759
Number of Correlated Noise Events at night (CNE night)	0	17
Operational Days	28.0	28.0
Number of Correlated Noise Events (CNE <sub>xx</sub> ) day/night	CNE <sub>xx</sub>	CNE <sub>xx</sub>
CNE <sub>60</sub> – day	705	1318
CNE <sub>60</sub> – night	0	9
CNE <sub>65</sub> – day	372	602
CNE <sub>65</sub> – night	0	4
CNE <sub>70</sub> – day	95	163
CNE <sub>70</sub> – night	0	2
CNE <sub>75</sub> – day	10	24
CNE <sub>75</sub> – night	0	1
CNE <sub>80</sub> – day	1	1
CNE <sub>80</sub> – night	0	0
Number of Correlated Noise Events (CNE <sub>xx</sub> ) per 24hr period min – max		
CNE <sub>60</sub>	10 to 43	18 to 76
CNE <sub>65</sub>	5 to 19	9 to 33
CNE <sub>70</sub>	0 to 11	1 to 14
CNE <sub>75</sub>	0 to 3	0 to 4
CNE <sub>80</sub>	0 to 1	0 to 1
Average Number of Correlated Noise Events (CNE <sub>xx</sub> Ave.) day/night	CNE <sub>xx</sub> Ave.	CNE <sub>xx</sub> Ave.
CNE <sub>60</sub> Ave. – day	25.18	47.07
CNE <sub>60</sub> Ave. – night	0.00	0.32
CNE <sub>65</sub> Ave. – day	13.29	21.50
CNE <sub>65</sub> Ave. – night	0.00	0.14
CNE <sub>70</sub> Ave. – day	3.39	5.82
CNE <sub>70</sub> Ave. – night	0.00	0.07
CNE <sub>75</sub> Ave. – day	0.36	0.86
CNE <sub>75</sub> Ave. – night	0.00	0.04
CNE <sub>80</sub> Ave. – day	0.04	0.04
CNE <sub>80</sub> 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 LAmix Summary**

Min dB(A)	Max dB(A)	Average dB(A)
53.3	80.9	63.5

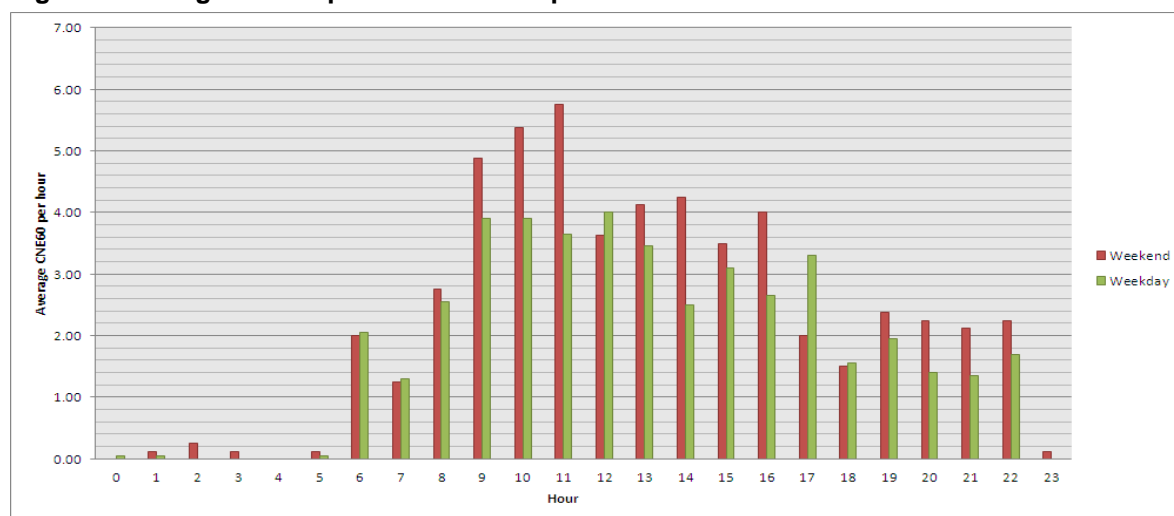
Note: Summary for operations that passed through the correlation zone (2.5km radius with 7,726ft height AGL)

## 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 6 presents daily average number of noise events 60dB(A) or above (CNE<sub>60</sub>) broken down on an hourly basis.

**Figure 6 Average CNE60 per Hour for All Operations**



The highest number of CNE<sub>60</sub> in any one hour throughout the reporting period was 12 on both the 23<sup>rd</sup> October 2012 between 5pm and 6pm and the 27<sup>th</sup> October 2012 between 11am and 12pm.

## 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 (LAmix) at the Carlingford EMU**

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAmix dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Piper Cherokee	Bankstown	A	11R	1	77.0	77.0	1
Airbus A340-200	Sydney	D	34L	2	74.3	75.2	1
Aerospatiale AS-355	Bankstown	T	H	1	74.2	74.2	1
Cessna 210	Bankstown	D	11L	1	71.8	71.8	1
Piper Arrow	Bankstown	A	11L	1	71.4	71.4	1
Boeing 747-400	Sydney	D	34L	59	70.9	80.9	8
Cessna 210	Bankstown	T	11L	1	70.3	70.3	1
Cessna 206	Bankstown	A	11L	1	70.2	70.2	1
Cessna 172	Bankstown	A	29L	1	69.5	69.5	1
Cirrus SR22	Bankstown	D	11L	1	69.5	69.5	1

**Table 8 Top 10 Most Correlated Aircraft Types Over the Carlingford EMU**

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAm <sub>ax</sub> dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Boeing 737-800	Sydney	A	16R	172	61.7	71.2	17
Airbus A320	Sydney	A	16R	101	63.9	72.1	10
Unknown	Bankstown	D	Unknown	99	63.7	78.0	8
Unknown	Bankstown	D	11L	80	64.4	76.2	14
Saab 340	Sydney	A	16R	74	60.6	66.4	9
Boeing 747-400	Sydney	D	34L	59	70.9	80.9	8
Boeing 767-300	Sydney	A	16R	58	62.7	74.6	8
Airbus A330-300	Sydney	D	34L	49	65.5	71.9	7
Unknown	Bankstown	D	29R	48	62.0	74.4	9
Boeing 747-400	Sydney	A	16R	47	66.6	78.1	6

## Conclusions

Following recommendations made in 'Review of the Sydney Environmental Monitoring Units', Short Term Monitoring was conducted at Carlingford during the period of 23<sup>rd</sup> October to 20<sup>th</sup> November 2012. It was determined the most common aircraft movements to traverse the Carlingford community are jet departures operating from Sydney Airport. During the reporting period 544 Bankstown movements passed through the capture zone, these were predominately non-flight planned general aviation operations.

Throughout the reporting period the highest number of correlated aircraft noise events exceeding 60dB(A) in one day was 76. On October 23<sup>rd</sup> during the period of 5pm and 6pm and October 27<sup>th</sup> during the period of 11am and 12pm, 12 events exceeding 60dB(A) occurred, this was the greatest number in one hour during the period. Residents in the area of Carlingford were exposed to noise events exceeding 75dB(A) during the hours of day and night. There were 9 correlated noise events above 60dB(A) that occurred during the hours of night. The average LAm<sub>ax</sub> during the reporting period was 63.5dB(A), with a max level of 80.9 dB(A) and minimum level of 53.3 dB(A) recorded.

Noise events above 60dB(A) were most common in the weekday hours of 9:00am to 6:00pm and on weekends in the period of 9:00am to 5:00pm.

A review of Tables 7 and 8 indicates the more frequent Sydney operations are on average not as loud as the lower flying Bankstown movements. The most common aircraft types to pass over Carlingford are Regular Public Transport (RPT) aircraft on arrival to Sydney Airport. The Boeing 747-400 features in both the loudest average aircraft noise levels and most frequent aircraft types to fly over the Carlingford EMU.

The correlation summary of 64% is a reasonable result 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 Carlingford 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/](http://www.airservicesaustralia.com/aircraftnoise/webtrak/))
- use our online form ([www.airservicesaustralia.com/aircraftnoise/about-making-a-complaint/](http://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](mailto:community.relations@airservicesaustralia.com) if you would like to provide feedback.