

Short Term Monitoring Program NSW, North Ryde Report

May 2013

Version Control

Version Number	Date	Detail
1.0	May 2013	Initial Release.
2.0	May 2013	Updated table 2 for minimum, maximum and average heights.
3.0	July 2013	CNE 60 and CNE 65 removed due to threshold settings.
4.0	January 2014	Figure 5 and L90 figures 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 – North Ryde, NSW

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

Sydney Airport Runway 16 Right jet arrivals are the most common movements to traverse the suburb of North Ryde.

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

25/02/2013 12:00am – 25/03/2013 12:00am

Environmental Monitoring Unit (EMU) Details

Location	Wicks Rd, North Ryde 2113
Latitude	33°48'1.99"S
Longitude	151°7'11.07"E
EMU Altitude	292ft above mean sea level
Capture Zone	2.5km radius with 8,000ft (above ground level) height for noise data capture
Threshold Settings	57.0 dB(A) to 67.0 dB(A) depending on time of day

Location Images

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

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



Figure 2 Total Movements Captured

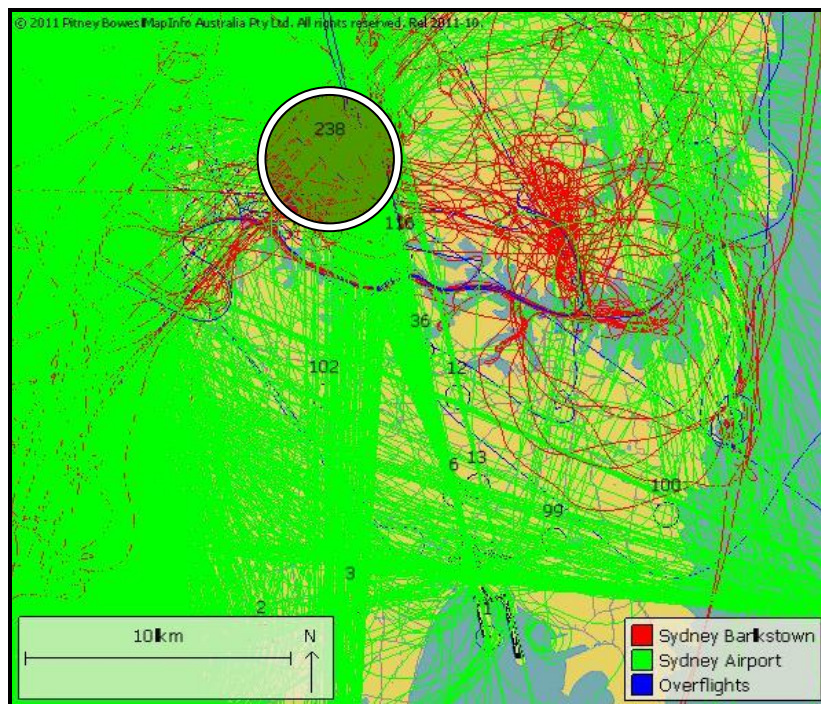


Figure 3 Sydney Airport Movements Captured

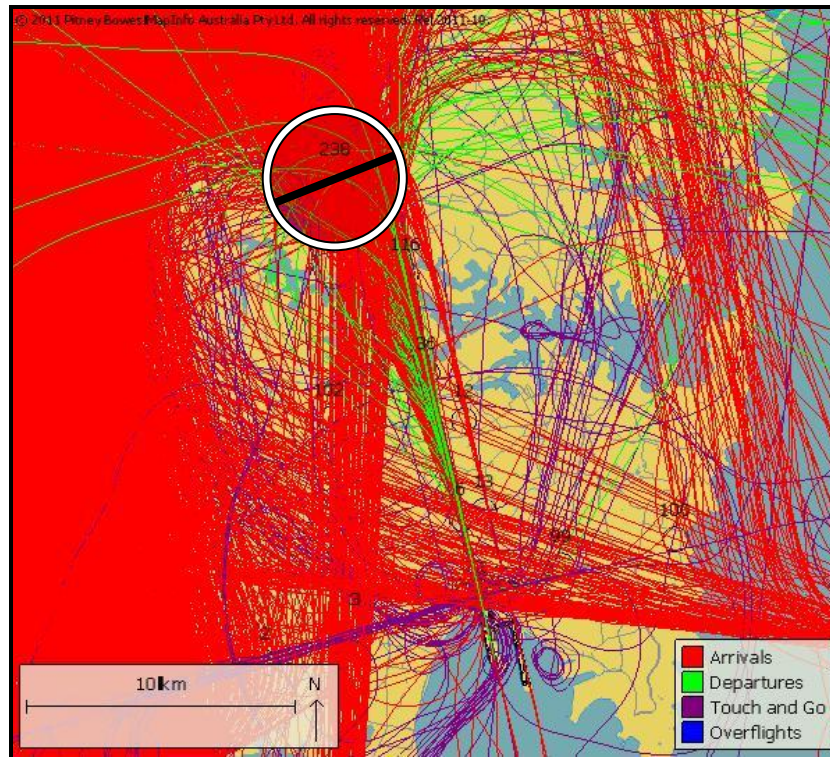
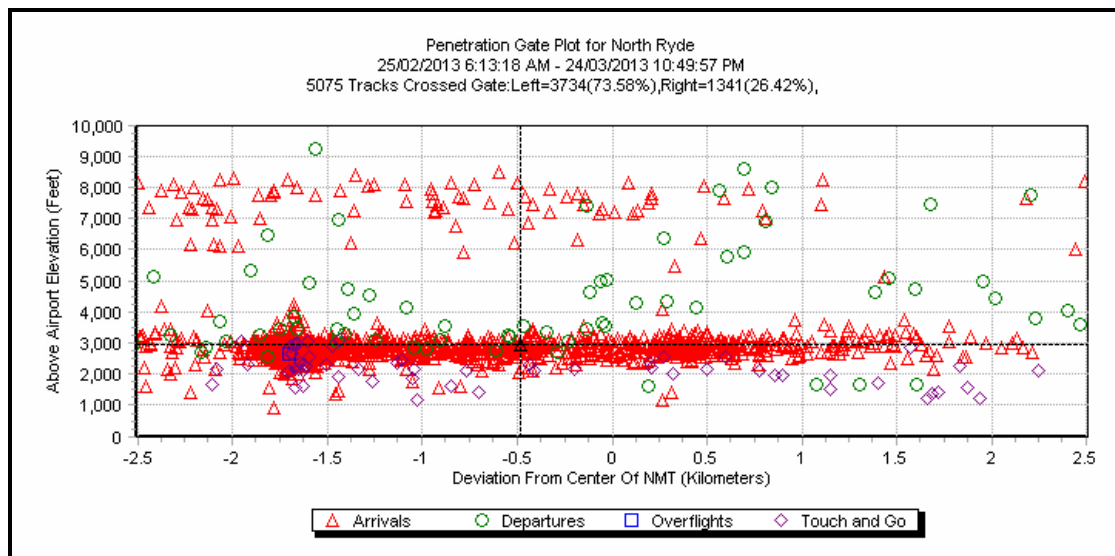


Figure 4 North Ryde Movements Through Capture Zone Penetration Gate



Note: Sydney Airport altitude is 21ft above mean sea level. EMU altitude is 292ft above mean sea level. The EMU altitude should be adjusted using 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 (25/02/2013 12:00am – 25/03/2013 12:00am)

Type of Operation	Sydney Airport Movements	All Movements
<i>Number of Movements Through Capture Zone*</i>	2,713	2,767
<i>Number of Correlated Noise Events (CNE)**</i>	391	473
<i>Number of Individual Movements with Correlated Noise Events (CNE)</i>	379	458
<i>Correlation Summary</i>	13.97%	16.55%

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

** May include operations that produced multiple noise events.

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

Type of Operation	Min*	Max*	Average*
<i>Departures Through Capture Zone**</i>	157	8,980	3,972
<i>Arrivals Through Capture Zone**</i>	668	8,228	2,708
<i>All Operations Through Capture Zone**</i>	157	8,980	2,722

* 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 departures typically fly at an altitude of 3,000 to 5,500 feet whilst jet arrivals typically traverse the EMU at an altitude of 2,000 to 3,500 feet.

Table 3 Captured Movements Breakdown By Airport and Aircraft Category

Airport	Jet	Turboprop	Light Propeller	Helicopter	Unknown*	Grand Total
<i>Sydney</i>	2,193	515	0	3	2	2,713
<i>Bankstown</i>	0	14	5	10	9	38
<i>Other</i>	1	1	2	2	10	16
Grand Total	2,194	530	7	15	21	2,767

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

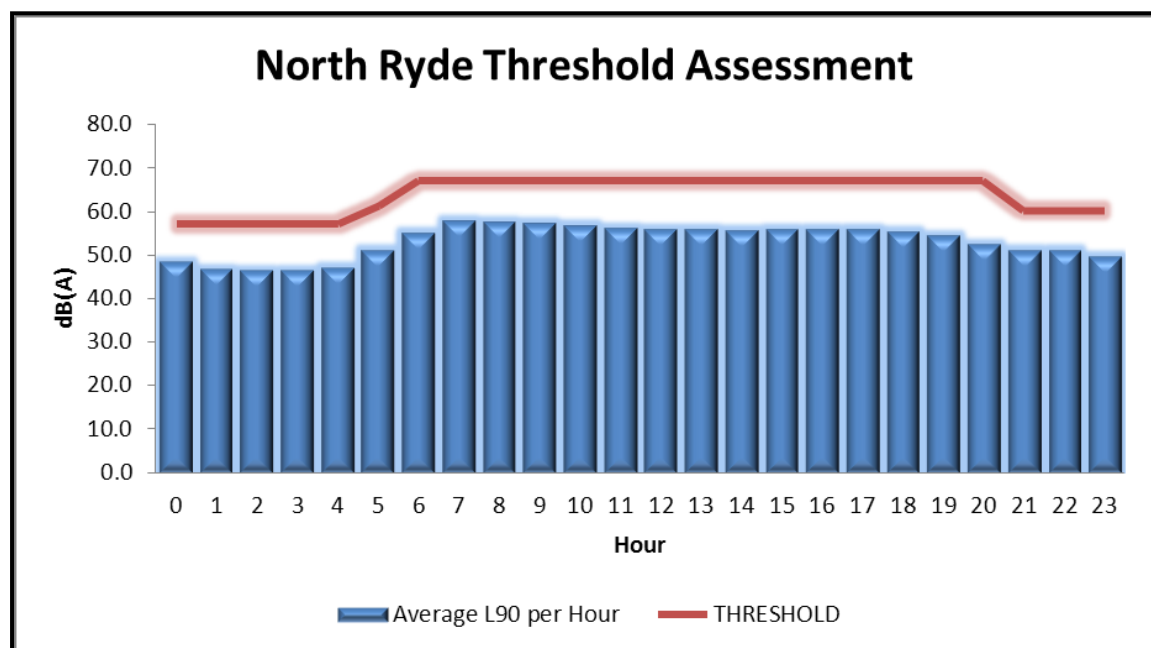
Correlation Summary

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. A correlation summary for all movements of 17% is a low result. This result is due to the background level at North Ryde being quite high during the hours of day. Whilst the noise created from the aircraft may be noticeable, they are not loud enough to create a clearly distinguishable noise event above the determined threshold settings shown below in Figure 5.

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 Sydney Airport movements that flew over the EMU, 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	60.6
L _{Aeq} (night), dBA	55.2
Background Day (L ₉₀ dBA)	55.2
Background Night (L ₉₀ dBA)	48.0

Table 5 Correlated Noise Events Summary

	Sydney Airport Movements	All Aircraft
Total number of Correlated Noise Events (CNE 24hr)	391	473
Number of Correlated Noise Events at night (CNE night)	0	7
Operational Days	28.0	28.0
Number of Correlated Noise Events (CNE_{xx}) day/night	CNE_{xx}	CNE_{xx}
CNE ₆₀ – day*	N/A	N/A
CNE ₆₀ – night*	N/A	N/A
CNE ₆₅ – day*	N/A	N/A
CNE ₆₅ – night	N/A	N/A
CNE ₇₀ – day	208	262
CNE ₇₀ - night	0	0
CNE ₇₅ – day	38	58
CNE ₇₅ - night	0	0
CNE ₈₀ – day	3	14
CNE ₈₀ - night	0	0
Number of Correlated Noise Events (CNE_{xx}) per 24hr period min – max		
CNE ₆₀ *	N/A	N/A
CNE ₆₅ *	N/A	N/A
CNE ₇₀	0 to 34	0 to 40
CNE ₇₅	0 to 8	0 to 9
CNE ₈₀	0 to 1	0 to 2
Average Number of Correlated Noise Events (CNE_{xx} Ave.) day/night	CNE_{xx} Ave.	CNE_{xx} Ave.
CNE ₆₀ Ave. – day*	N/A	N/A
CNE ₆₀ Ave. – night*	N/A	N/A
CNE ₆₅ Ave. – day*	N/A	N/A
CNE ₆₅ Ave. – night	N/A	N/A
CNE ₇₀ Ave. – day	7.43	9.36
CNE ₇₀ Ave. – night	0.00	0.00
CNE ₇₅ Ave. – day	1.36	2.07
CNE ₇₅ Ave. – night	0.00	0.00
CNE ₈₀ Ave. – day	0.11	0.50
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.

*The count of CNE₆₀ and CNE₆₅ events are not applicable due to the threshold settings of 57-67dB(A) as depicted in Figure 5.

Table 6 LAmx Summary

Min dB(A)	Max dB(A)	Average dB(A)
57.8	88.7	70.2

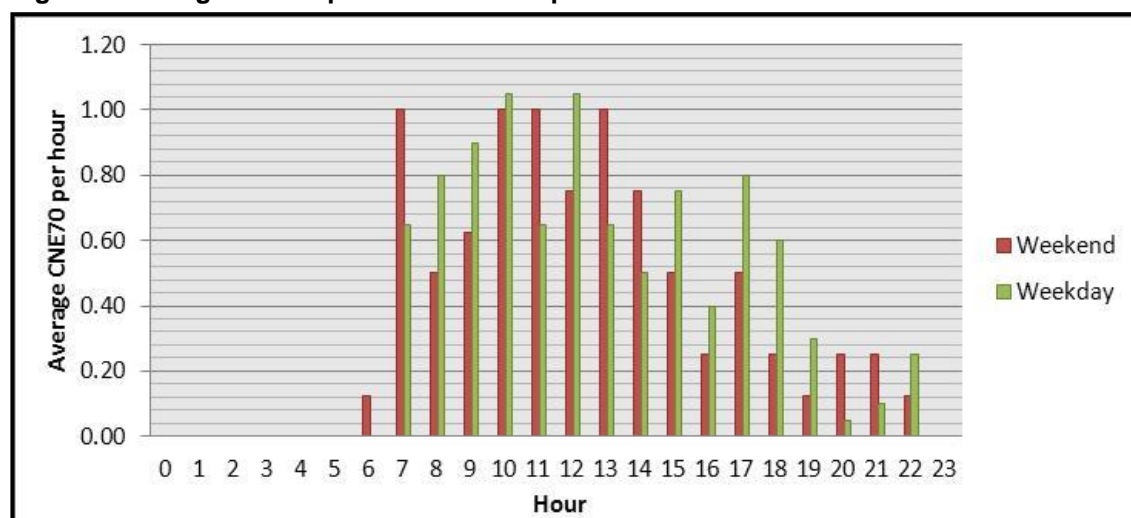
Note: Summary for operations that passed through the correlation zone (2.5km radius with 8,000ft height AGL)

CNE70 Count by Hour

A large number of noise events were between 70dB(A) and 75dB(A). Therefore further investigation was undertaken on the number of correlated noise events that exceed 70dB(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 70dB(A) or above (CNE₇₀) broken down on an hourly basis.

Figure 6 Average CNE70 per Hour for All Operations



The highest number of CNE₇₀ during any one hour throughout the reporting period was 7. This occurred on the 4th March 2013 between 5pm and 6pm and the 18th March 2013 between 8am and 9am.

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 (LAmx) at the North Ryde EMU

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAmx dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Boeing 737-800 (J)	Sydney	A	34L	1	85.4	85.4	1
Airbus A340-500 (J)	Sydney	A	16R	1	77.7	77.7	1
Boeing 747-400 (J)	Sydney	D	34L	24	76.1	81.8	4
Airbus A330-200 (J)	Sydney	D	34L	2	74.1	76.1	1
Airbus A330-200 (J)	Sydney	A	16L	1	74.0	74.0	1
Embraer E190 (J)	Sydney	A	16L	1	73.7	73.7	1
Robinson R44 (H)	Bankstown	A	H	3	73.7	76.4	3
Eurocopter AS350 (H)	Royal North Shore HLS	A	H	2	73.7	73.8	2
Airbus A380-800 (J)	Sydney	D	34L	2	73.4	73.6	1
Guimbal G-2 Cabri (H)	Bankstown	A	H	1	73.0	73.0	1

Table 8 Top 10 Most Correlated Aircraft Types Over the North Ryde 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 (J)	Sydney	A	16R	83	69.2	81.0	17
Airbus A320 (J)	Sydney	A	16R	80	69.3	80.1	18
Airbus A330-200 (J)	Sydney	A	16R	44	70.1	77.5	7
Boeing 767-300 (J)	Sydney	A	16R	35	71.2	78.8	7
Boeing 747-400 (J)	Sydney	A	16R	28	70.0	82.9	9
Boeing 747-400 (J)	Sydney	D	34L	24	76.1	81.8	4
Airbus A330-300 (J)	Sydney	A	16R	21	71.2	76.2	3
Boeing 737-400 (J)	Sydney	A	16R	21	70.5	74.1	5
Boeing 777-200 (J)	Sydney	A	16R	18	71.5	74.9	4
Boeing 777-300ER (J)	Sydney	A	16R	13	66.7	76.0	4

Aircraft Category: Jet (J), Turboprop (T), Propeller (P), Helicopter (H), Unknown (U)

Conclusions

Following recommendations made in 'Review of the Sydney Environmental Monitoring Units', Short Term Monitoring was conducted at North Ryde during the period of 25th February to 25th March 2013. It was determined the most common aircraft movements to traverse the North Ryde community are jet departures operating from Sydney Airport. During the reporting period 33 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 70dB(A) in one day was 40. The highest number of CNE₇₀ in any one hour throughout the reporting period was 7. This occurred on the 4th March 2013 between 5pm and 6pm and the 18th March 2013 between 8am and 9am.

Residents in the area of North Ryde were exposed to a correlated noise events exceeding 80dB(A) during the hours of day. There were no correlated noise events above 70dB(A) that occurred during the hours of night. The average L_Amax during the reporting period was 70.2dB(A), with a max level of 88.7dB(A) and minimum level of 57.8dB(A) recorded.

Noise events above 70dB(A) were most common in the weekday hours of 10:00am to 1:00pm and on weekends in the periods of 7:00am to 8:00am and 10:00am to 2:00pm.

A review of Tables 7 and 8 indicates less frequent, one off events were on average louder than the more frequently correlated Runway 16R jet arrivals. These jet arrivals are also the most common aircraft types to pass over North Ryde. The Boeing 747-400 features in both the loudest average aircraft noise levels and most frequent aircraft types to fly over the North Ryde EMU.

The correlation summary of 17% is a low result. Whilst the noise created from the aircraft may be noticeable, many aircraft operations are not loud enough to create a noise event above the determined threshold settings.

Due to the distinctive flight paths and distance from Sydney Airport, it is not expected the ratio of arrival and departure flights over North Ryde 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
J	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.