Short Term Monitoring Program

Lindfield Report, NSW

connecting australian aviation

Change Summary

Version 1: 19 March 2014		
Section/ Clause	**Summary**	**NRFC**

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1. Deployment Details

1.1 Deployment Purpose

Short term noise monitoring was conducted at Lindfield (17km north of Sydney Airport) following recommendations made by the community.

During the reporting period the area was predominately traversed by Runway 16 Right and 16 Left arrivals.

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

1.2 Deployment Monitoring Period

23/12/2013 12:00am – 20/01/2014 12:00am

1.3 Noise Monitoring Terminal (NMT) Details

Location	Private Residence, Koonawarra Avenue, Lindfield NSW 2070
Latitude	33°46'53.25"S
Longitude	151°09'20.59"E
NMT Altitude	203ft above mean sea level
Capture Zone	2.5km radius with 8,000ft (above ground level) height for noise data capture
Threshold Settings	48.0 dB(A) to 54.0 dB(A) depending on time of day

2. Location Images

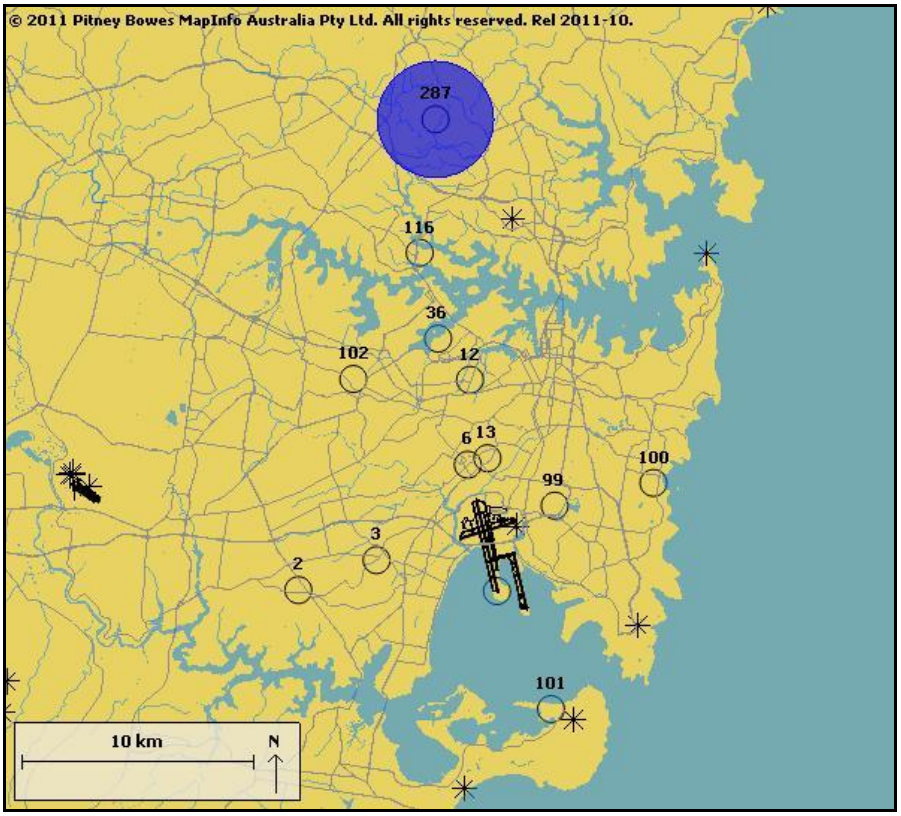

Figure 1: Sydney Fixed NMT Location and the Lindfield Short Term Monitoring Program Deployment Location

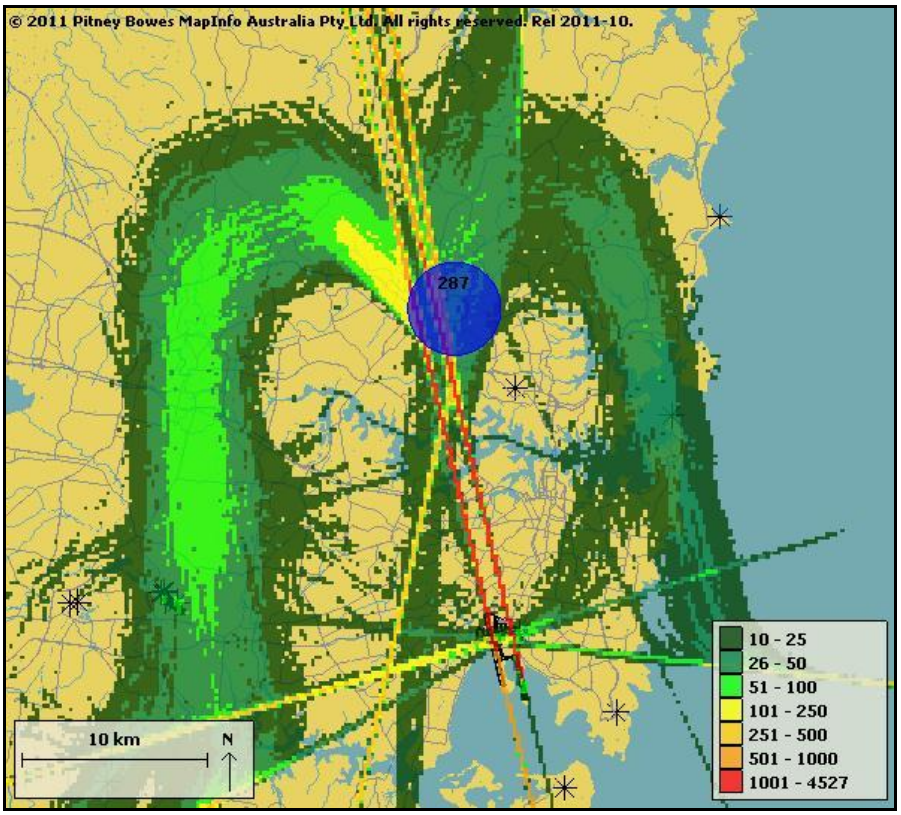

Figure 2: Total Movements Captured Track Density for the Monitoring Period

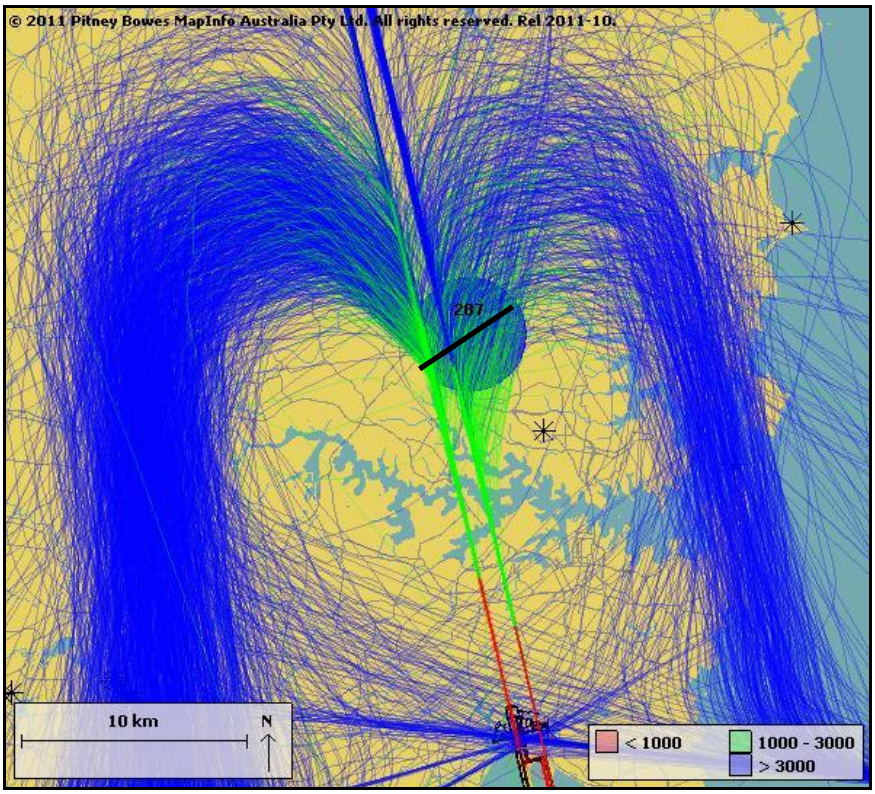

Figure 3: Sydney Airport Jet Runway 16 Left and 16 Right Arrivals Captured by Altitude

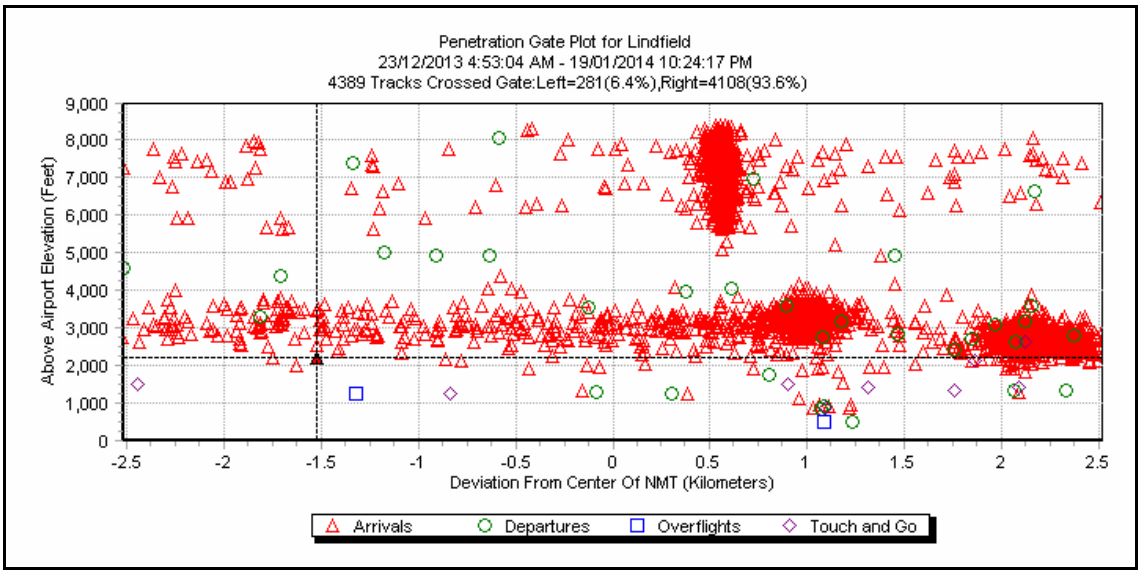

Figure 4: Lindfield Movements Through Capture Zone Penetration Gate

Note: Sydney Airport is 21ft above mean sea level. NMT altitude is 203ft above mean sea level. The NMT altitude should be adjusted from the data shown above in order to draw conclusions about height above ground of aircraft operations.

The black line though the capture zone in Figure 3 is a penetration gate, which was crossed by all the flights shown in Figure 4. Some movements within the capture zone are not shown as they did not cross the penetration gate. Some flights may cross the penetration gate more than once, at different altitudes. This may happen, for example, if a flight passes through the penetration gate at a low altitude soon after take off, then again after having climbed to a higher altitude. This may also occur for arrivals.

3. Deployment Findings

The following tables present a summary of the operations data.

Table 1 Movement Summary (23/12/2013 12:00am – 20/01/2014 12:00am)

Type of Operation	Runway 16 Left and 16 Right Jet Arrival Movements	All Movements
Number of Movements Through Capture Zone*	2,044	4,527
Number of Correlated Noise Events (CNE)	1,774	2,442
Number of Movements with Correlated Noise Events (CNE)	1,748	2,386
Correlation Summary	85.52%	52.71%

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

Note: ** May include operations that produced multiple noise events.

3.1 Correlation Summary

An evaluation of the number of aircraft operations were matched with noise events recorded by the NMT. This is an important aspect of assessing performance of the noise monitoring installation. Ideally, all operations passing the NMT 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 53% is considered to be an average result, based on reviews of fixed noise monitoring terminals nationally.

3.2 Movement Analysis

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

Type of Operation	Min*	Max*	Average*
Departures Through Capture Zone**	293	7,893	3,280
Arrivals Through Capture Zone**	682	8,229	3,476
All Operations Through Capture Zone**	279	8,229	3,469

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

Note: ** Includes all airports within Sydney Basin.

Table 3 Captured Movements Breakdown By Airport and Aircraft Category

Airport	Jet	Turboprop	Light Propeller	Helicopter	Unknown*	Grand Total
Sydney	3,748	746	0	3	0	4,497
Other	0	7	6	5	12	30
Grand Total	**3,748**	**753**	**6**	**8**	**12**	**4,527**

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

3.3 Background Noise Levels and Threshold Settings

At the monitoring site, background noise levels are first assessed to determine the appropriate threshold settings for the NMT. 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.

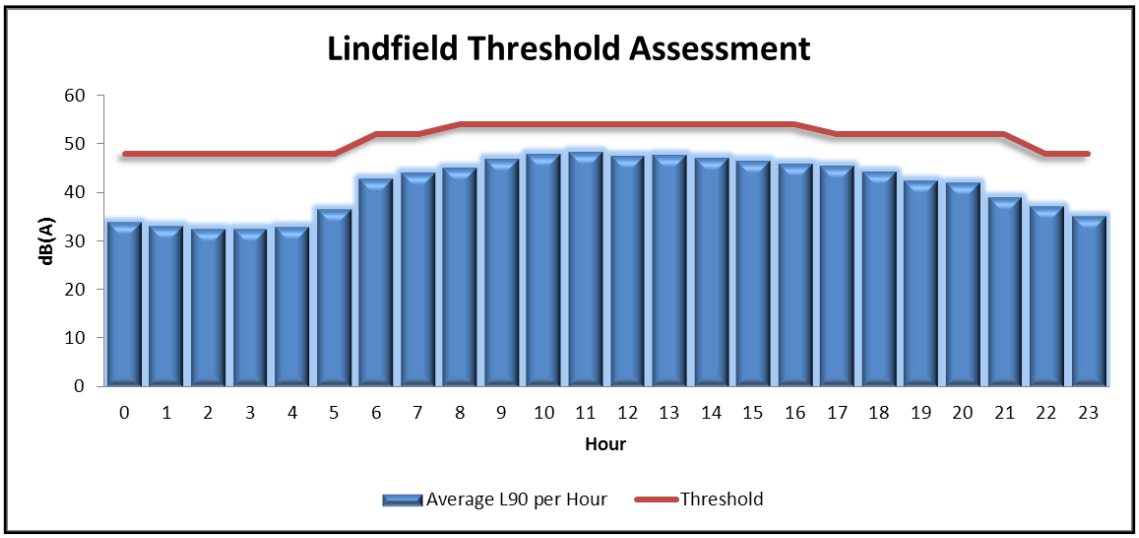

Figure 5: Background and Threshold Assessment

4. Noise Level 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 Runway 16 Left and Right jet arrival movements that flew over the NMT, as well as all aircraft that flew over the NMT, 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	Noise Level (dB(A))
LAeq 24 hr, dB(A)	52.2
LAeq (night), dB(A)	41.0
Background Day (L90 dB(A))	44.8
Background Night (L90 dB(A))	33.9

Table 5 Correlated Noise Events Summary

	Runway 16 Left and 16 Right Jet Arrival Movements	All Aircraft
Total number of Correlated Noise Events (CNE 24hr)	1,774	2,442
Number of Correlated Noise Events at Night (CNE night)	1	5
Operational Days	28.0	28.0
Number of Correlated Noise Events (CNExx) day/night	**CNExx**	**CNExx**
CNE_{60} – day	1,192	1,539
CNE_{60} - night	0	0
CNE_{65} – day	241	351
CNE_{65} – night	0	0
CNE_{70} – day	71	110
CNE_{70} - night	0	0
CNE_{75} – day	13	29
CNE_{75} - night	0	0
CNE_{80} – day	2	9
CNE_{80}- night	0	0

Number of Correlated Noise Events (CNExx) per 24hr period min – max	Runway 16 Left and 16 Right Jet Arrival Movements	All Aircraft
CNE_{60}	0 to 118	1 to 137
CNE_{65}	0 to 29	1 to 35
CNE_{70}	0 to 13	0 to 14
CNE_{75}	0 to 5	0 to 6
CNE_{80}	0 to 1	0 to 2
Average Number of Correlated Noise Events (CNExx Ave.) day/night	**CNExx Ave.**	**CNExx Ave.**
CNE_{60} Ave. – day	42.57	54.96
CNE_{60} Ave. – night	0.00	0.00
CNE_{65} Ave. – day	8.61	12.54
CNE_{65} Ave. – night	0.00	0.00
CNE_{70} Ave. – day	2.54	3.93
CNE_{70} Ave. – night	0.00	0.00
CNE_{75} Ave. – day	0.46	1.04
CNE_{75} Ave. – night	0.00	0.00
CNE_{80} Ave. – day	0.07	0.32
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 LAmax Summary

Min dB(A)	Max dB(A)	Average dB(A)
52.2	85.1	61.6

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

4.1 CNE Count by Hour

A large number of noise events occurred between 60dB(A) and 70B(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_{60}) broken down on an hourly basis.

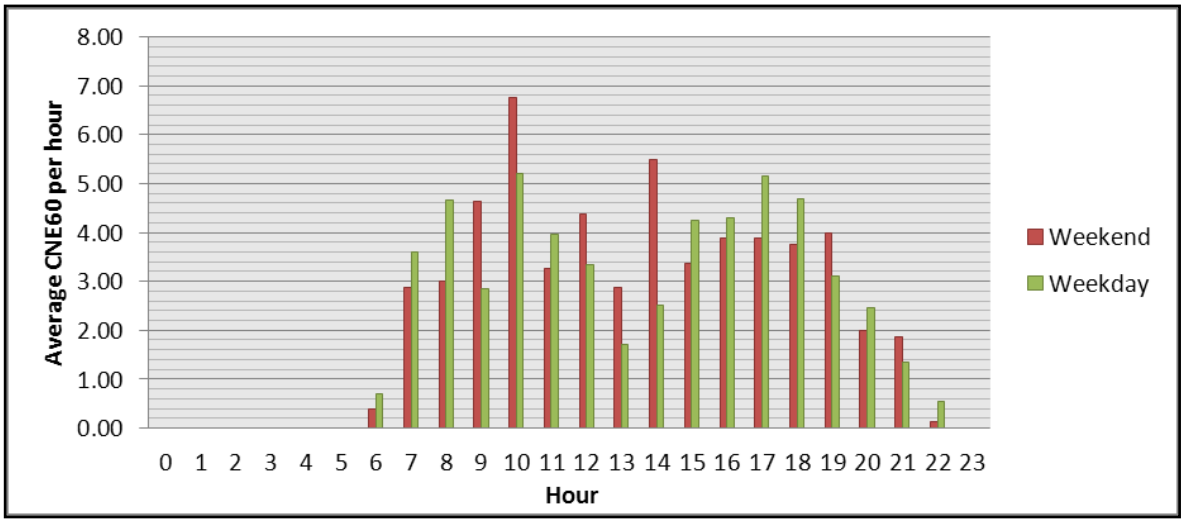

Figure 6: Average CNE60 per Hour for All Operations

The highest number of CNE60 in any one hour throughout the reporting period was 17. This occurred between 10am and 11am on December 27th and January 4th.

5. Aircraft Noise Levels

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

Table 7 Top 10 Average Aircraft Noise Levels (LAmax) at the Lindfield Noise Monitoring Terminal

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAmax dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Boeing 747-400 (J)	Sydney	D	34L	22	75.8	85.1	3
Airbus A380 (J)	Sydney	D	34L	3	72.9	78.2	1
Boeing 777-300ER (J)	Sydney	D	34L	5	70.4	73.7	1
Airbus A330-200 (J)	Sydney	D	34L	2	69.5	70.1	1
Airbus A340-300 (J)	Sydney	D	34L	1	69.4	69.4	1
Boeing 747-400 (J)	Sydney	A	07	1	69.0	69.0	1
Robinson R44 (H)	Parramatta Heliport	A	H	2	67.9	69.4	2
Boeing 737-800 (J)	Sydney	D	34L	5	67.8	70.8	3
Airbus A330-300 (J)	Sydney	A	16L	1	66.1	66.1	1
Robinson R44 (H)	Bankstown	D	H	2	65.0	69.9	2

Table 8 Top 10 Most Correlated Aircraft Types Over the Lindfield Noise Monitoring Terminal

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAmax dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Boeing 737-800 (J)	Sydney	A	16L	578	61.9	77.8	60
Airbus A320 (J)	Sydney	A	16L	420	64.0	76.9	42
Airbus A320 (J)	Sydney	A	16R	114	59.5	77.6	19
deHavilland Dash 8 400 (T)	Sydney	A	16L	104	60.1	68.6	12
SAAB 340 (T)	Sydney	A	16L	100	60.9	80.3	15
Boeing 737-800 (J)	Sydney	A	16R	96	58.4	73.1	16
deHavilland Dash 8 300 (T)	Sydney	A	16L	90	61.1	70.8	10
Boeing 747-400 (J)	Sydney	A	16R	78	61.4	78.4	9
Airbus A330-200 (J)	Sydney	A	16R	70	60.7	74.9	11
Embraer E-190 (J)	Sydney	A	16L	65	60.4	76.8	10

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

Note: **Operation Type:** Arrival (A), Departure (D), Local Operation (T), Overflight (O)

6. Conclusions

Short term noise monitoring was conducted in Lindfield during the period of 23rd December to 20th January 2014. This followed recommendations made by the community. The most common aircraft movements to traverse the Lindfield are Sydney Regular Public Transport (RPT) Runway 16 Left and 16 Right arrivals.

Throughout the reporting period the highest number of correlated aircraft noise events exceeding 70dB(A) in one day was 14.

The highest number of CNE60 in any one hour throughout the reporting period was 17. This occurred between 10am and 11am on both December 27th and January 4th. Residents in the area of Lindfield were exposed to correlated noise events exceeding 75dB(A) during the day. There were no correlated noise events above 60dB(A) that occurred during the hours of night. The average correlated LAmax during the reporting period was 61.6dB(A), with a max level of 85.1dB(A) and minimum level of 52.2dB(A) recorded.

Noise events above 60dB(A) were most common in the weekday hours of 10:00am to 11:00am and 5:00pm to 6:00pm. On weekends noise events above 60dB(A) were most common between 10:00am to 11:00am and 2:00pm to 3:00pm.

A review of Tables 7 and 8 indicates the average loudest movements residents of Lindfield experience were generally Runway 34 Left departures. The most frequent correlated movements were Sydney Airport Runway 16 Left arrivals.

The correlation summary of 53% for all movements is considered an average result based on reviews of fixed noise monitoring terminals nationally. During the reporting period Sydney Airport Runway 16 Left and 16 Right jet arrivals had a correlation summary of 86%.

7. 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/

8. 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.

9. 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
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)
LAmax	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
NMT	Noise Monitoring Terminal
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”.

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