Short Term Monitoring Program
NSW, Haberfield Report

May 2013

connecting australian aviation

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 removed due to threshold settings.
4.0	January 2014	Figure 5 and L90 figures updated due to technical issue.

Deployment Purpose – Haberfield, NSW

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

Runway 16 Left jet arrivals and the reciprocal 34 Right jet departures are the most common operations to traverse the suburb of Haberfield.

The purpose of this report is to provide a technical summary of the recorded aircraft noise and operational data collected at Haberfield 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	Haberfield Public School, Haberfield NSW 2045
Latitude	33°52'47.68"S
Longitude	151°8'3.71"E
EMU Altitude	105ft above mean sea level
Capture Zone	2.5km radius with 8,000ft (above ground level) height for noise data capture
Threshold Settings	56.0 dB(A) to 61.0 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 Haberfield EMU.

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

Figure 2 Total Movements Captured

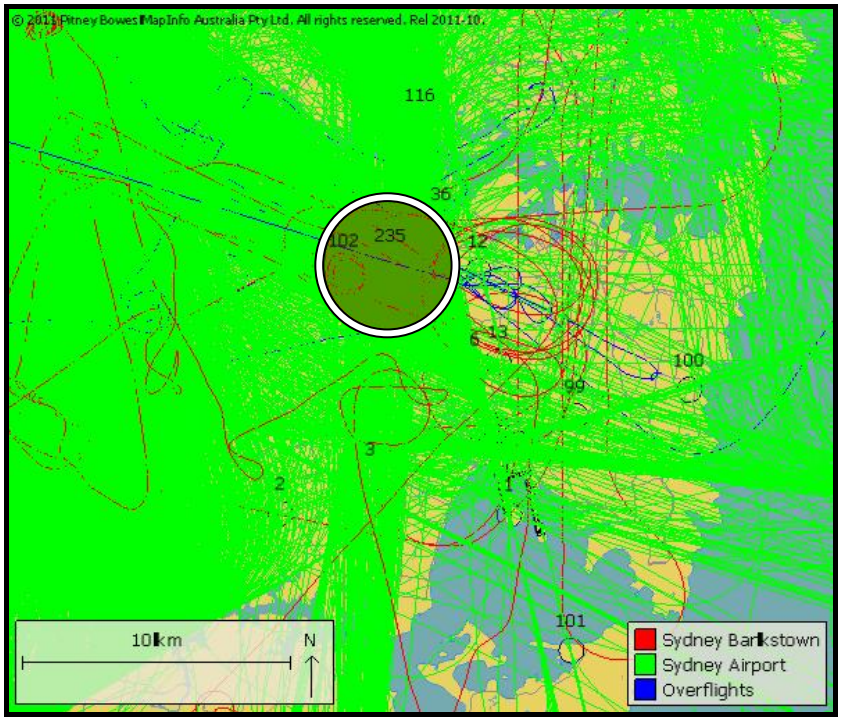


Figure 3 Sydney Airport Movements Captured

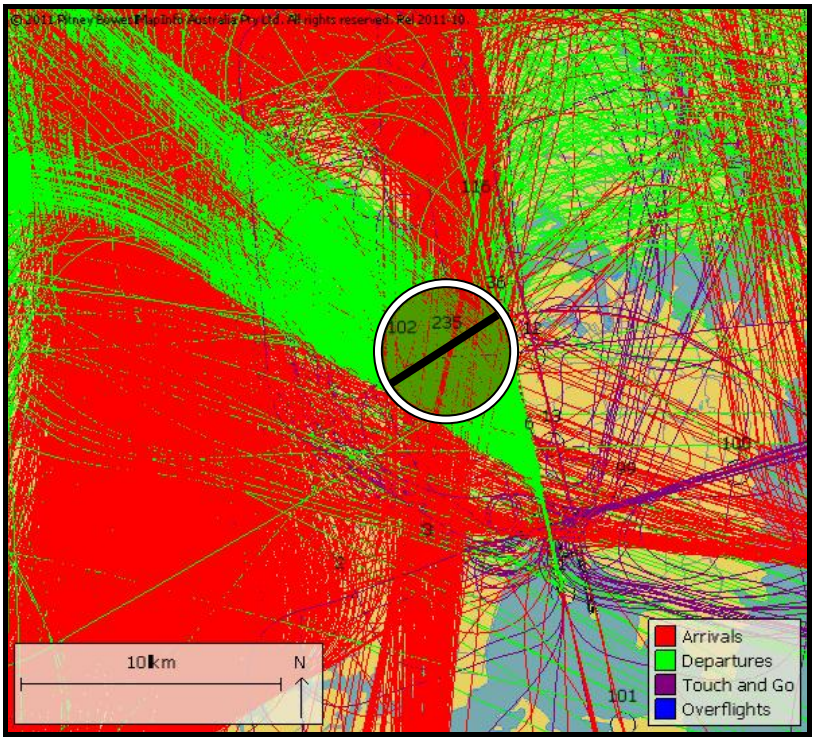
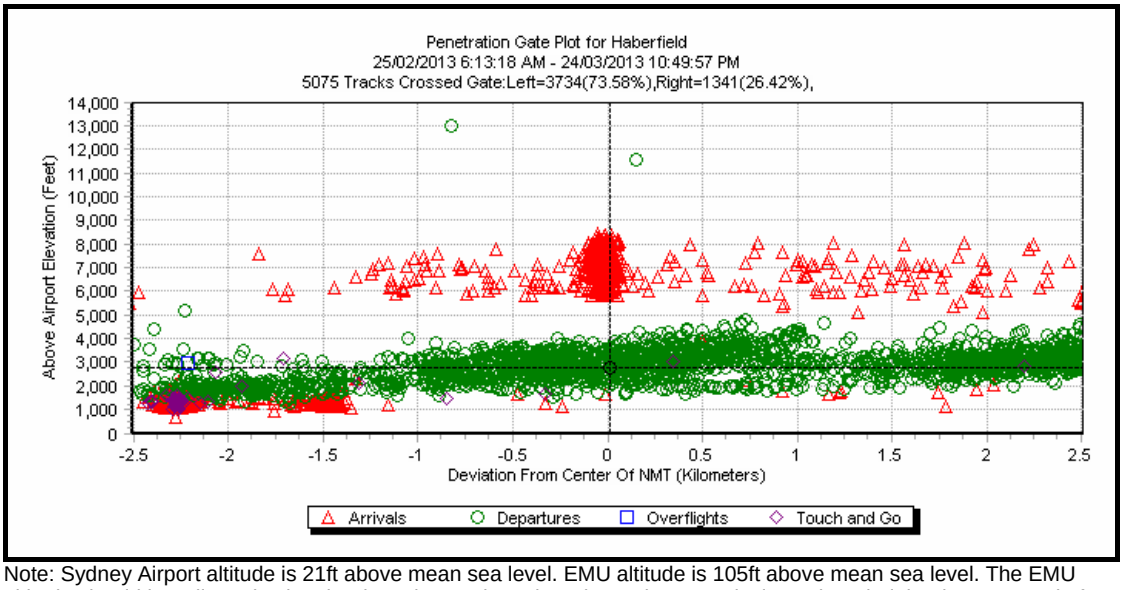


Figure 4 Haberfield Movements Through Capture Zone Penetration Gate



Note: Sydney Airport altitude is 21ft above mean sea level. EMU altitude is 105ft 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 though 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
*Number of Movements Through Capture Zone**	5,120	5,137
Number of Correlated Noise Events (CNE)	1,672	1,679
Number of Individual Movements with Correlated Noise Events (CNE)	1,666	1,673
Correlation Summary	32.54%	32.57%

* 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*
*Departures Through Capture Zone***	1,217	12,895	2,775
*Arrivals Through Capture Zone***	624	8,346	2,261
*All Operations Through Capture Zone***	624	12,895	2,447

* 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 1,500 to 4,000 feet, whilst jet arrivals typically fly at an altitude of 5,500 to 8,000 feet.

Table 3 Captured Movements Breakdown By Airport and Aircraft Category

Airport	Jet	Turboprop	Light Propeller	Helicopter	Unknown*	Grand Total
Sydney	4,511	603	0	4	2	**5,120**
Bankstown	0	0	1	1	3	**5**
Other	1	0	1	10	0	**12**
Grand Total	**4,512**	**603**	**2**	**15**	**5**	**5,137**

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

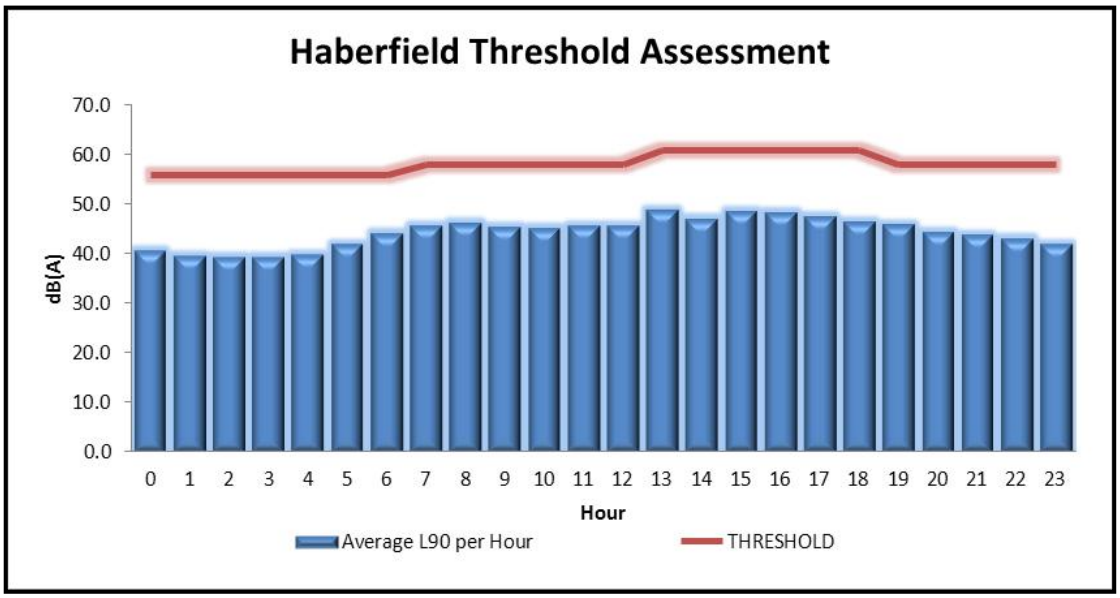
Correlation Summary

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 33% is a relatively low result. This result is due to the background level at Haberfield 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	
LAeq 24 hr, dBA	56.6
LAeq (night), dBA	44.5
Background Day (L90 dBA)	46.0
Background Night (L90 dBA)	40.5

Table 5 Correlated Noise Events Summary

	Sydney Airport Movements	All Aircraft
Total number of Correlated Noise Events (CNE 24hr)	1,672	1,679
Number of Correlated Noise Events at night (CNE night)	0	4
Operational Days	28.0	28.0
Number of Correlated Noise Events (CNExx) day/night	**CNExx**	**CNExx**
CNE_{60} – day*	N/A	N/A
CNE_{60} - night	N/A	N/A
CNE_{65} – day	1,486	1,488
CNE_{65} – night	0	2
CNE_{70} – day	1,164	1,166
CNE_{70} - night	0	0
CNE_{75} – day	635	635
CNE_{75} - night	0	0
CNE_{80} – day	96	96
CNE_{80}- night	0	0
Number of Correlated Noise Events (CNExx) per 24hr period min – max		
CNE_{60}*	N/A	N/A
CNE_{65}	0 to 98	0 to 98
CNE_{70}	0 to 83	0 to 83
CNE_{75}	0 to 43	0 to 43
CNE_{80}	0 to 9	0 to 9
Average Number of Correlated Noise Events (CNExx Ave.) day/night	**CNExx Ave.**	**CNExx Ave.**
CNE_{60} Ave. – day*	N/A	N/A
CNE_{60} Ave. – night	N/A	N/A
CNE_{65} Ave. – day	53.07	53.14
CNE_{65} Ave. – night	0.00	0.07
CNE_{70} Ave. – day	41.57	41.64
CNE_{70} Ave. – night	0.00	0.00
CNE_{75} Ave. – day	22.68	22.68
CNE_{75} Ave. – night	0.00	0.00
CNE_{80} Ave. – day	3.43	3.43
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 events are not applicable due to the threshold settings of 56-61dB(A) as depicted in Figure 5

Table 6 LAmax Summary

Min dB(A)	Max dB(A)	Average dB(A)
57.5	88.2	72.5

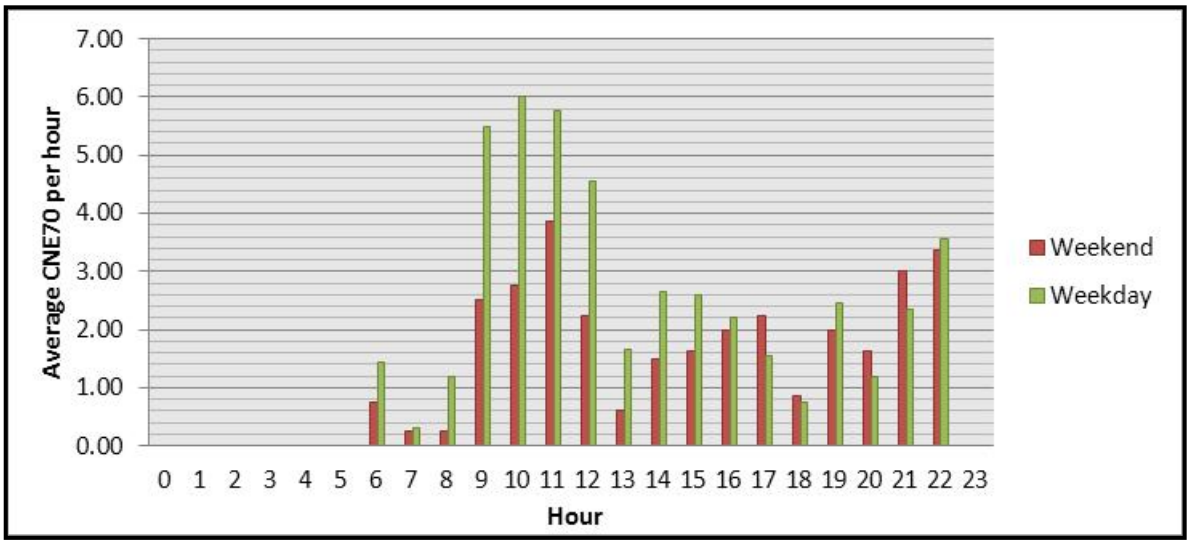
Note: Summary for operations that passed through the correlation zone (2.5km radius with 8,000ft height AGL)

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 (CNE_{70}) broken down on an hourly basis.

Figure 6 Average CNE70 per Hour for All Operations



The highest number of CNE_{70} in any one hour throughout the reporting period was 13 on both the 8th and 16th March 2013 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 (LAmax) at the Haberfield EMU

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAmax dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Airbus A340-500 (J)	Sydney	D	34L	1	81.0	81.0	1
McDonnell Douglas MD-11 (J)	Sydney	D	34L	36	77.4	81.3	3
Airbus A330-300 (J)	Sydney	D	34L	197	76.2	82.4	14
Boeing 777-300 (J)	Sydney	D	34L	20	76.1	82.5	2
Boeing 777-200 (J)	Sydney	D	34L	95	74.7	82.7	8
Airbus A380-800 (J)	Sydney	D	34L	91	74.5	87.3	6
Airbus A340-600 (J)	Sydney	D	34L	20	74.3	82.3	2
Boeing 747-400 (J)	Sydney	D	34L	214	74.2	88.2	17
Boeing 777-300ER (J)	Sydney	D	34L	98	74.1	80.2	7
Airbus A330-200 (J)	Sydney	D	34L	224	73.6	86.7	16

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

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	D	34L	278	70.7	82.3	21
Airbus A330-200 (J)	Sydney	D	34L	224	73.6	86.7	16
Boeing 747-400 (J)	Sydney	D	34L	214	74.2	88.2	17
Airbus A330-300 (J)	Sydney	D	34L	197	76.2	82.4	14
Airbus A320 (J)	Sydney	D	34L	107	70.9	77.4	9
Boeing 777-300ER (J)	Sydney	D	34L	98	74.1	80.2	7
Boeing 777-200 (J)	Sydney	D	34L	95	74.7	82.7	8
Airbus A380-800 (J)	Sydney	D	34L	91	74.5	87.3	6
McDonnell Douglas MD-11 (J)	Sydney	D	34L	36	77.4	81.3	3
Boeing 767-300 (J)	Sydney	D	34L	36	71.9	80.6	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 Haberfield during the period of 25th February to 25th March 2013. It was determined the most common aircraft movements to traverse the Haberfield community are jet arrivals and departures operating from Sydney Airport. During the reporting period 5 Bankstown movements passed through the capture zone.

Throughout the reporting period the highest number of correlated aircraft noise events exceeding 70dB(A) in one day was 83. On both the 8th and 16th March 2013 between 10am and 11am, 13 events exceeding 70dB(A) occurred, this was the greatest number in one hour during the period. Residents in the area of Haberfield were exposed to a correlated noise events exceeding 65dB(A) during the hours of day and night. There were 2 correlated noise events above 65dB(A) that occurred during the hours of night. The average LAmax during the reporting period was 72.5dB(A), with a max level of 88.2dB(A) and minimum level of 57.5dB(A) recorded.

Noise events above 70dB(A) were most common during the weekday hours of 9:00am to 1:00pm and 10:00pm to 11:00pm. Conversely, on weekends these events were most common during the periods of 11:00am to 12:00pm and 9:00pm to 11:00pm.

A review of Tables 7 and 8 indicates the Runway 34 Left jet departure operations are both the loudest average and most frequently correlated aircraft types to fly over the Haberfield EMU. Seven aircraft types feature in both tables; however the most correlated aircraft type, the Boeing 737-800, does not feature in the loudest aircraft type table.

The correlation summary of 33% is a relatively low result. 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.

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