

# **Short Term Monitoring Program**

## **Darlington 2 Report, NSW**

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# Change Summary

Version 1: 26 March 2014		
Section/ Clause	Summary	NRFC

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## 1. Deployment Details

### 1.1 Deployment Purpose

Short term noise monitoring was conducted at Darlington (6km north of Sydney Airport) following a review by Airservices Australia on previous short term monitoring in the area. Airservices found the previous monitoring in Darlington was affected by high background noise levels. This resulted in relatively high threshold settings for the deployment and consequently a lower than expected number of aircraft noise events captured by the system.

During the reporting period the area was predominately traversed by Runway 16 Left arrivals and 34 Right departures.

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

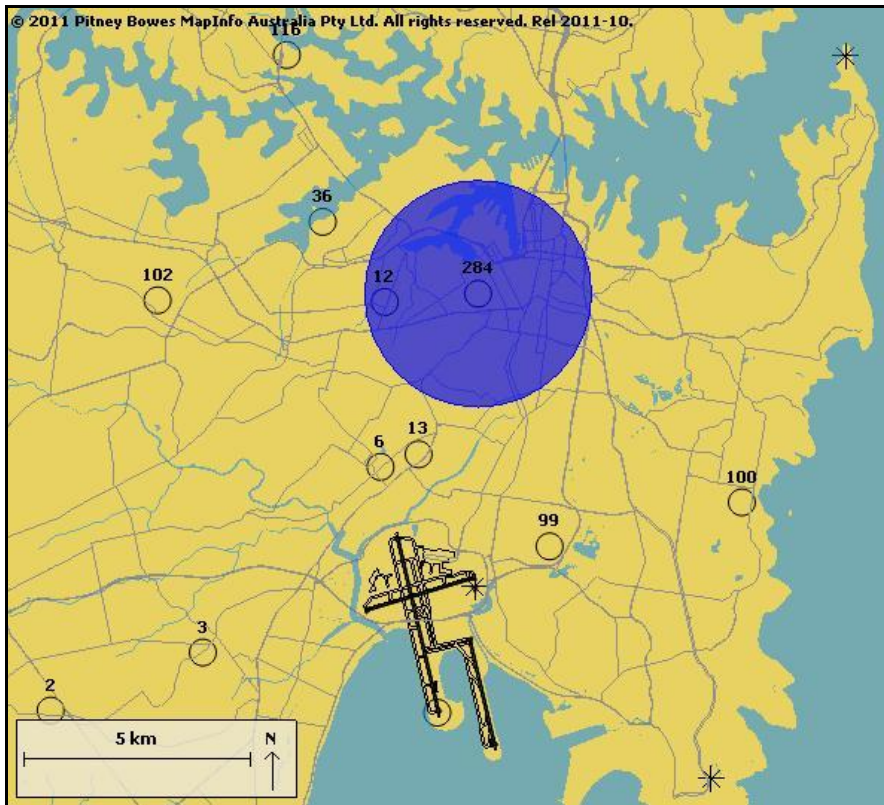
### 1.2 Deployment Monitoring Period

20/01/2014 12:00am – 17/02/2014 12:00am

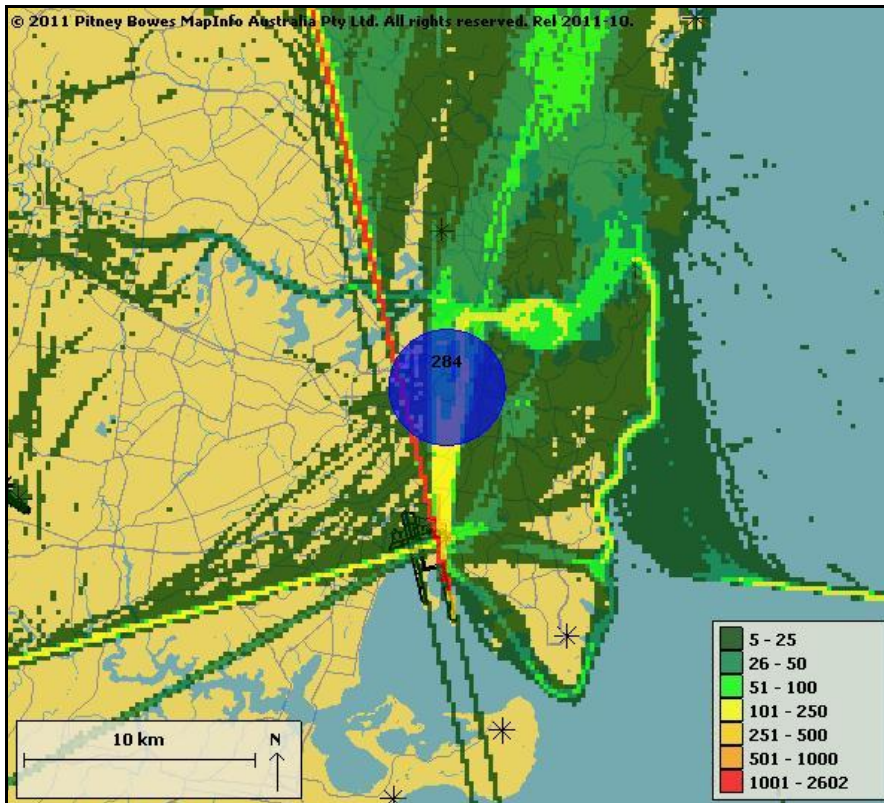
### 1.3 Noise Monitoring Terminal (NMT) Details

Location	Private Residence, Lander Street, Darlington NSW 2008
Latitude	33°52'52.04"S
Longitude	151°11'30.65"E
NMT Altitude	66ft above mean sea level
Capture Zone	2.5km radius with 8,000ft (above ground level) height for noise data capture
Threshold Settings	50.0 dB(A) to 54.0 dB(A) depending on time of day

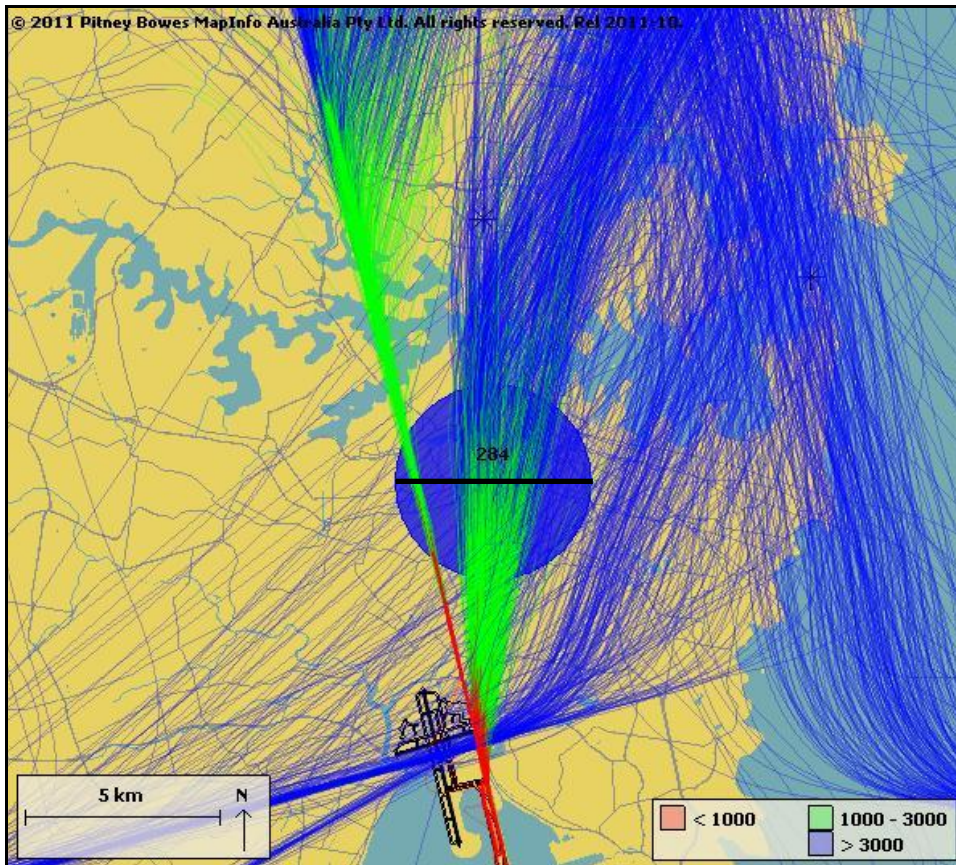
## 2. Location Images



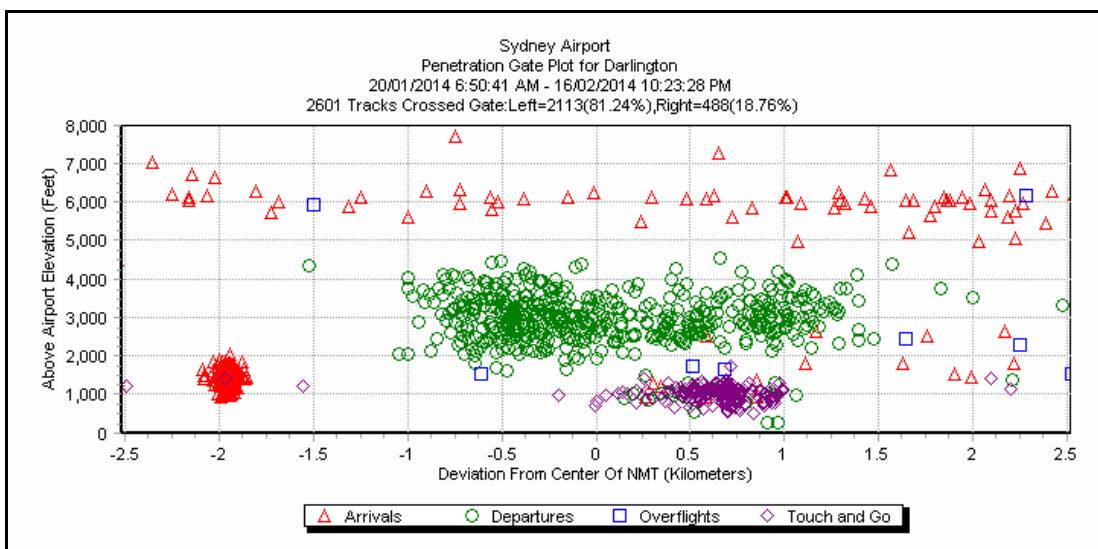
**Figure 1:** Sydney Fixed NMT Location and the Darlington Short Term Monitoring Program Deployment Location



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



**Figure 3:** Sydney Airport Jet Runway 16 Left Arrivals and Runway 34 Right Departures Captured by Altitude



**Figure 4:** Darlington Movements Through Capture Zone Penetration Gate

**Note:** Sydney Airport is 21ft above mean sea level. NMT altitude is 66ft 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 through 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 (20/01/2014 12:00am – 17/02/2014 12:00am)**

Type of Operation	Runway 16 Left Arrival and 34 Right Departure Movements	All Movements
Number of Movements Through Capture Zone*	2,291	2,602
Number of Correlated Noise Events (CNE)	1,574	1,943
Number of Movements with Correlated Noise Events (CNE)	1,443	1,687
Correlation Summary	62.99%	64.83%

**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 65% 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**	205	4,508	2,869
Arrivals Through Capture Zone**	873	7,660	1,567
All Operations Through Capture Zone**	205	7,660	1,781

**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.

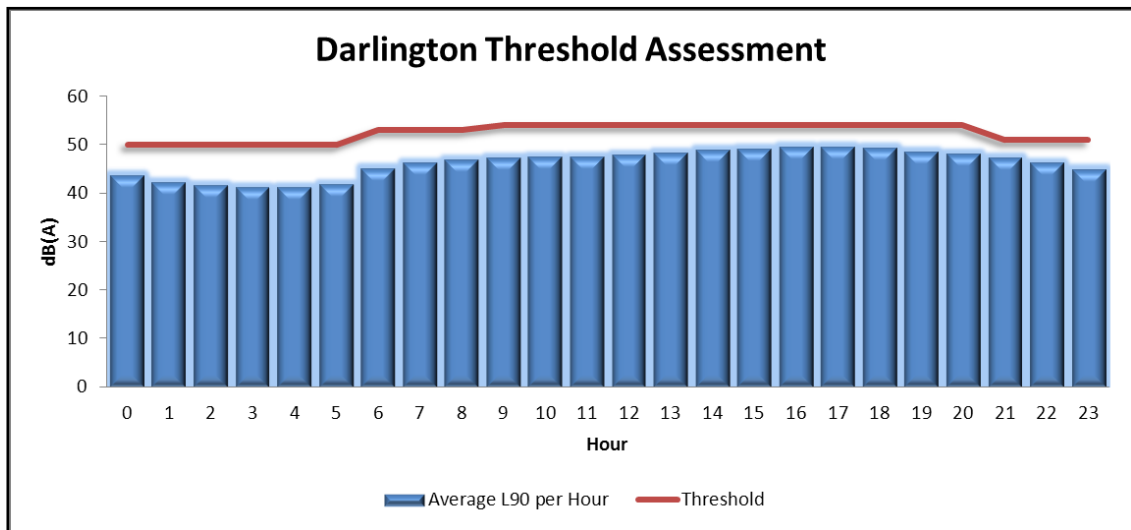
**Table 3 Captured Movements Breakdown By Airport and Aircraft Category**

Airport	Jet	Turboprop	Light Propeller	Helicopter	Unknown*	Grand Total
Sydney	1,195	1,135	4	219	1	2,554
Other	1	2	2	17	26	48
<b>Grand Total</b>	<b>1,196</b>	<b>1,137</b>	<b>6</b>	<b>236</b>	<b>27</b>	<b>2,602</b>

**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 arrivals and 34 Right departure 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))
L <sub>Aeq</sub> 24 hr, dB(A)	53.2
L <sub>Aeq</sub> (night), dB(A)	46.8
Background Day (L <sub>90</sub> dB(A))	48.0
Background Night (L <sub>90</sub> dB(A))	42.5

**Table 5 Correlated Noise Events Summary**

	Runway 16 Left Arrival and 34 Right Departure Movements	All Aircraft
Total number of Correlated Noise Events (CNE 24hr)	1,574	1,943
Number of Correlated Noise Events at Night (CNE night)	0	2
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	757	999
CNE <sub>60</sub> - night	0	1
CNE <sub>65</sub> – day	257	338
CNE <sub>65</sub> – night	0	0
CNE <sub>70</sub> – day	46	63
CNE <sub>70</sub> - night	0	0
CNE <sub>75</sub> – day	11	14
CNE <sub>75</sub> - night	0	0
CNE <sub>80</sub> – day	2	3
CNE <sub>80</sub> - night	0	0



Number of Correlated Noise Events (CNE <sub>xx</sub> ) per 24hr period min – max	Runway 16 Left Arrival and 34 Right Departure Movements	All Aircraft
CNE <sub>60</sub>	14 to 42	14 to 53
CNE <sub>65</sub>	2 to 20	3 to 22
CNE <sub>70</sub>	0 to 6	0 to 6
CNE <sub>75</sub>	0 to 3	0 to 3
CNE <sub>80</sub>	0 to 2	0 to 2
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	27.04	35.68
CNE <sub>60</sub> Ave. – night	0.00	0.04
CNE <sub>65</sub> Ave. – day	9.18	12.07
CNE <sub>65</sub> Ave. – night	0.00	0.00
CNE <sub>70</sub> Ave. – day	1.64	2.25
CNE <sub>70</sub> Ave. – night	0.00	0.00
CNE <sub>75</sub> Ave. – day	0.39	0.50
CNE <sub>75</sub> Ave. – night	0.00	0.00
CNE <sub>80</sub> Ave. – day	0.07	0.11
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 L<sub>A</sub>max Summary**

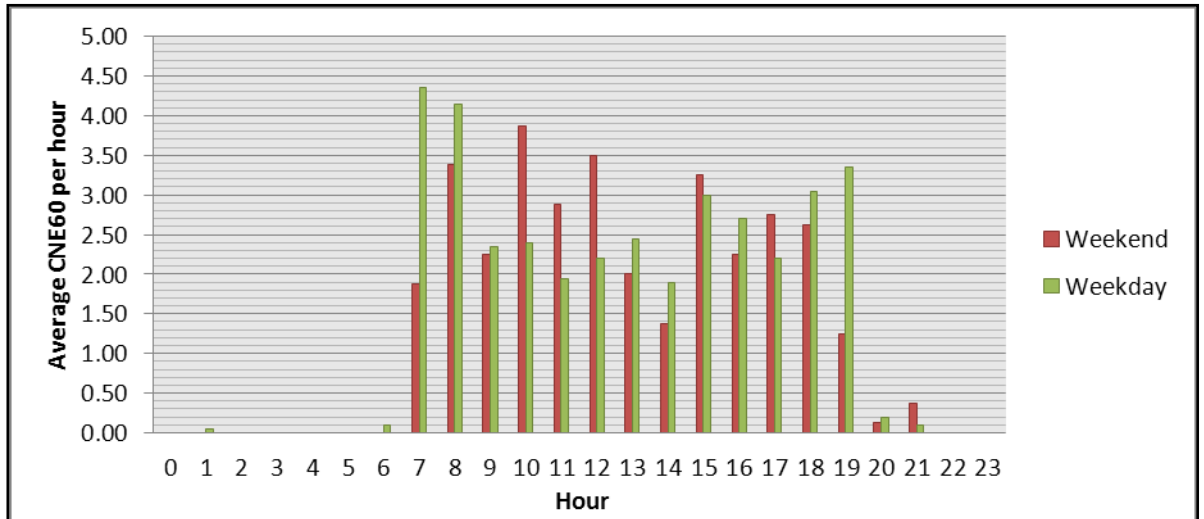
Min dB(A)	Max dB(A)	Average dB(A)
51.3	82.0	60.8

**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 9. This occurred twice during the reporting period. On January 31<sup>st</sup> between 7pm and 8pm and on February 4<sup>th</sup> between 7am and 8am.

## 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 Darlington Noise Monitoring Terminal**

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAmax dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Bell 407 (H)	Sydney	A	H	1	71.5	71.5	1
Boeing 737-800 (J)	Sydney	A	07	1	69.4	69.4	1
Eurocopter EC-130 (H)	Sydney	T	H	3	67.3	73.9	2
Bell 206 (J)	Sydney	D	H	5	67.2	73.4	2
Beech Baron (P)	Sydney	D	34R	1	66.9	66.9	1
Unknown Helicopter (H)	Prince Henry Hospital	O	Unknown	4	65.7	72.8	4
Eurocopter AS350 (H)	Sydney	A	H	1	65.5	65.5	1
ATR-72-600 (T)	Sydney	D	34R	26	65.5	70.0	2
Bell 407 (H)	Sydney	D	H	3	65.3	69.9	2
Cessna 310 (P)	Sydney	A	16L	1	65.1	65.1	1

**Table 8 Top 10 Most Correlated Aircraft Types Over the Darlington 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	409	58.6	75.5	51
Airbus A320 (J)	Sydney	A	16L	182	59.1	82.0	23
Robinson R44 (H)	Sydney	T	H	154	62.1	80.9	21
deHavilland Dash 8 300 (T)	Sydney	D	34R	151	64.6	77.8	15
SAAB 340 (T)	Sydney	A	16L	134	59.2	71.9	19
deHavilland Dash 8 400 (T)	Sydney	D	34R	110	63.9	69.5	10
SAAB 340 (T)	Sydney	D	34R	95	63.4	75.8	9
deHavilland Dash 8 300 (T)	Sydney	A	16L	84	60.0	80.4	14
Robinson R66 (H)	Sydney	T	H	81	61.5	74.7	14
deHavilland Dash 8 400 (T)	Sydney	A	16L	77	59.9	79.1	11

**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)

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## 6. Conclusions

Short term noise monitoring was conducted in Darlington during the period of 20<sup>th</sup> January 2014 to 17<sup>th</sup> February 2014. This followed recommendations made by Airservices Australia. The most common aircraft movements to traverse the Darlington area are Sydney Regular Public Transport (RPT) Runway 16 Left arrivals and 34 Right departures.

Throughout the reporting period the highest number of correlated aircraft noise events exceeding 70dB(A) in one day was 6.

The highest number of CNE60 in any one hour throughout the reporting period was 9. This occurred twice during the reporting period. On January 31<sup>st</sup> between 7pm and 8pm and on February 4<sup>th</sup> between 7am and 8am. Residents in the area of Darlington were exposed to correlated noise events exceeding 75dB(A) during the day. There was 1 correlated noise event above 60dB(A) that occurred during the hours of night. The average correlated L<sub>Amax</sub> during the reporting period was 60.8dB(A), with a max level of 82.0dB(A) and minimum level of 51.3dB(A) recorded.

Noise events above 60dB(A) were most common in the weekday hours of 7:00am to 9:00am and 6:00pm to 8:00pm. On weekends noise events above 60dB(A) were most common between 10:00am to 1:00pm.

A review of Tables 7 and 8 indicates the average loudest movements and most frequently correlated movements residents of Darlington experience were generally helicopters and Sydney Airport Runway 16 Left arrivals.

The correlation summary of 65% 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 arrivals and 34 Right departures had a correlation summary of 63%.

## 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/>

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## 8. 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.

## 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
CNE <sub>xx</sub>	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
LA <sub>eq</sub>	Continuous equivalent noise level over a time period
LA <sub>eq</sub> 24hr	Continuous equivalent noise level over a 24 hour period
LA <sub>eq</sub> night	Continuous equivalent noise level over the night time period (hours of 11:00pm to 6:00am)
LA <sub>max</sub>	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
N <sub>xx</sub>	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](mailto:community.relations@airservicesaustralia.com) if you would like to provide feedback.