

Short Term Monitoring Program WA, Bibra Lake Report

May 2013

Version Control

Version Number	Date	Detail
1.0	May 2013	Initial Release.
2.0	January 2014	Figure 5 and L90 figures updated due to technical issue.
3.0	January 2014	CNE 60 removed due to threshold settings.

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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 – Bibra Lake, WA

Following recommendations for noise monitoring around Jandakot Airport made in the 'Review of the Perth Environmental Monitoring Units' undertaken by Airservices in 2011, Bibra Lake was selected as a Short Term Monitoring location.

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

10/11/2012 12:00am – 08/12/2012 12:00am

Environmental Monitoring Unit (EMU) Details

Location	Treaty Oak Cove, Bibra Lake 6163
Latitude	32°5'32.10"S
Longitude	115°48'55.26"E
EMU Altitude	145ft above mean sea level
Capture Zone	2.5km radius with 8,145ft (above ground level) height for noise data capture
Threshold Settings	57.0 dB(A) to 62.0 dB(A) depending on time of day

Location Images

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

Figure 1 Perth Fixed Environmental Monitoring Unit Locations and the Bibra Lake Short Term Monitoring Program Deployment Location

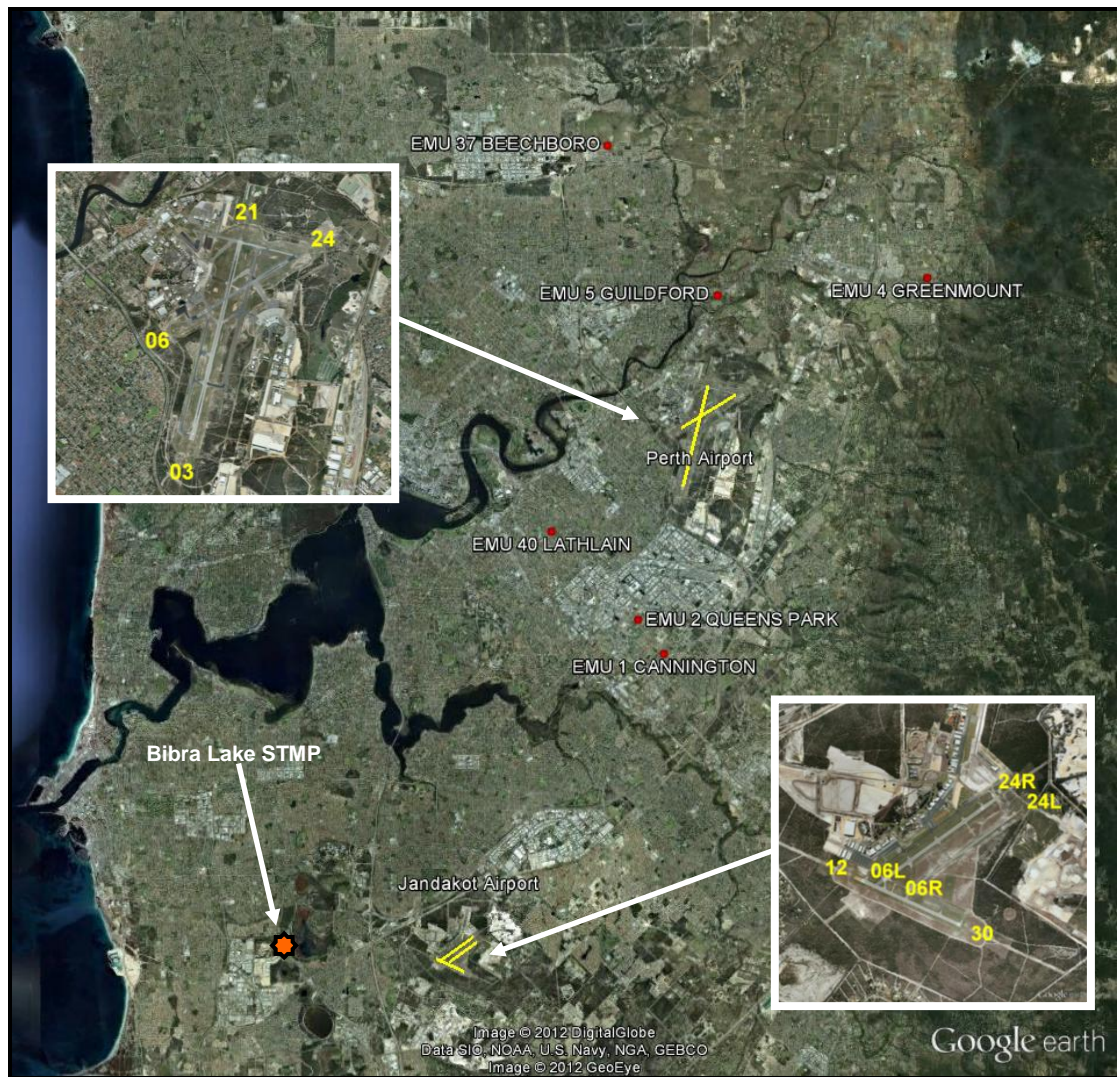


Figure 2 Total Movements Captured

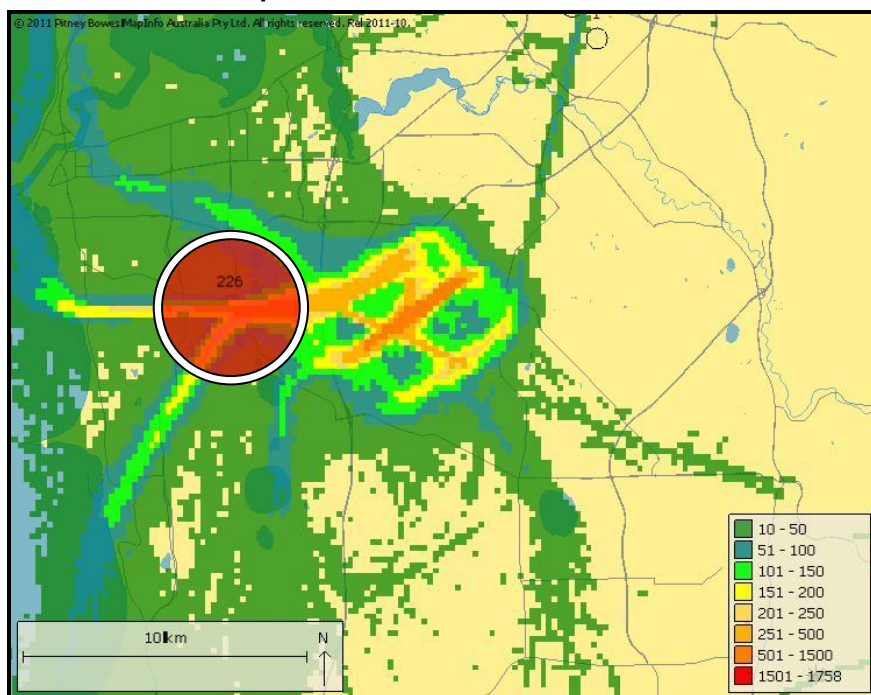


Figure 3 Jandakot Airport Movements Captured

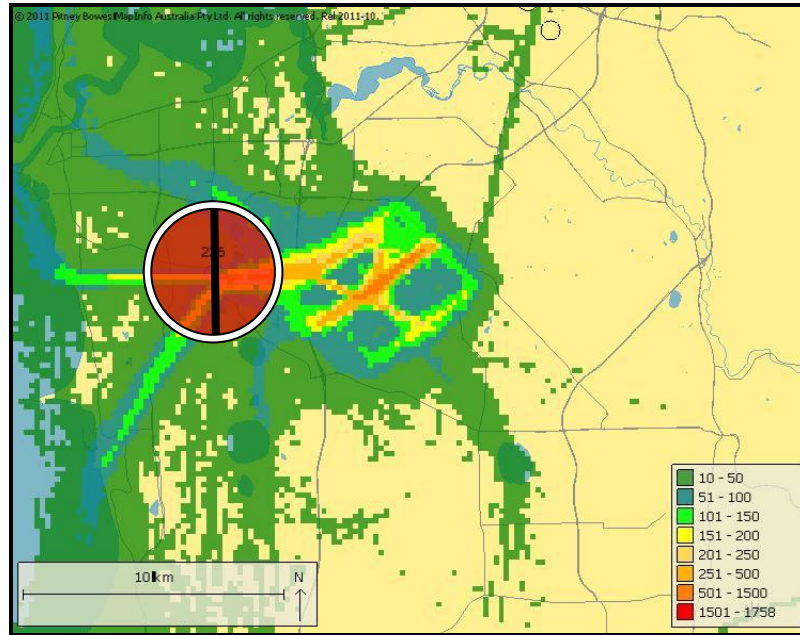
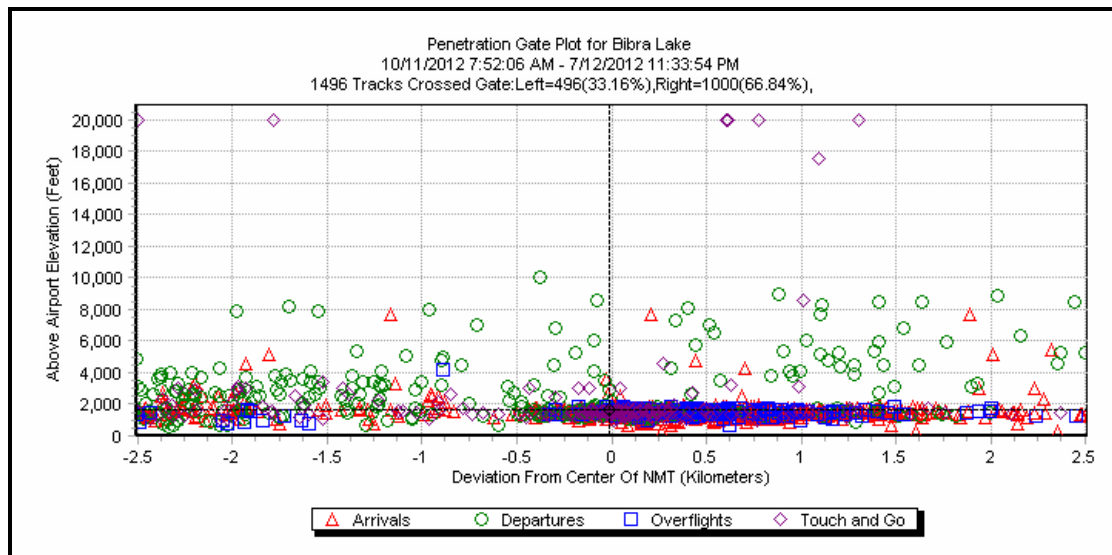


Figure 4 Bibra Lake Movements Through Capture Zone Penetration Gate



Note: Perth Airport altitude is 67ft above mean sea level. EMU altitude is 145ft 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 (10/11/2012 12:00am – 08/12/2012 12:00am)

Type of Operation	Jandakot Airport Movements	All Movements
<i>Number of Movements Through Capture Zone*</i>	1,363	1,748
<i>Number of Correlated Noise Events (CNE)</i>	684	881
<i>Number of Individual Movements with Correlated Noise Events (CNE)</i>	577	754
<i>Correlation Summary</i>	42.33%	43.14%

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

** May include operations that produced multiple noise events.

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 43% is a reasonably low result. This result is due to the background level at Bibra Lake 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 noise event above the determined threshold settings shown below in Figure 5.

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

Type of Operation	Min*	Max*	Average*
<i>Departures Through Capture Zone**</i>	424	9,893	2,365
<i>Arrivals Through Capture Zone**</i>	140	7,622	1,437
<i>All Operations Through Capture Zone**</i>	140	19,876	1,753

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

** Includes all airports within Perth Basin.

Table 3 Captured Movements Breakdown By Airport and Aircraft Category

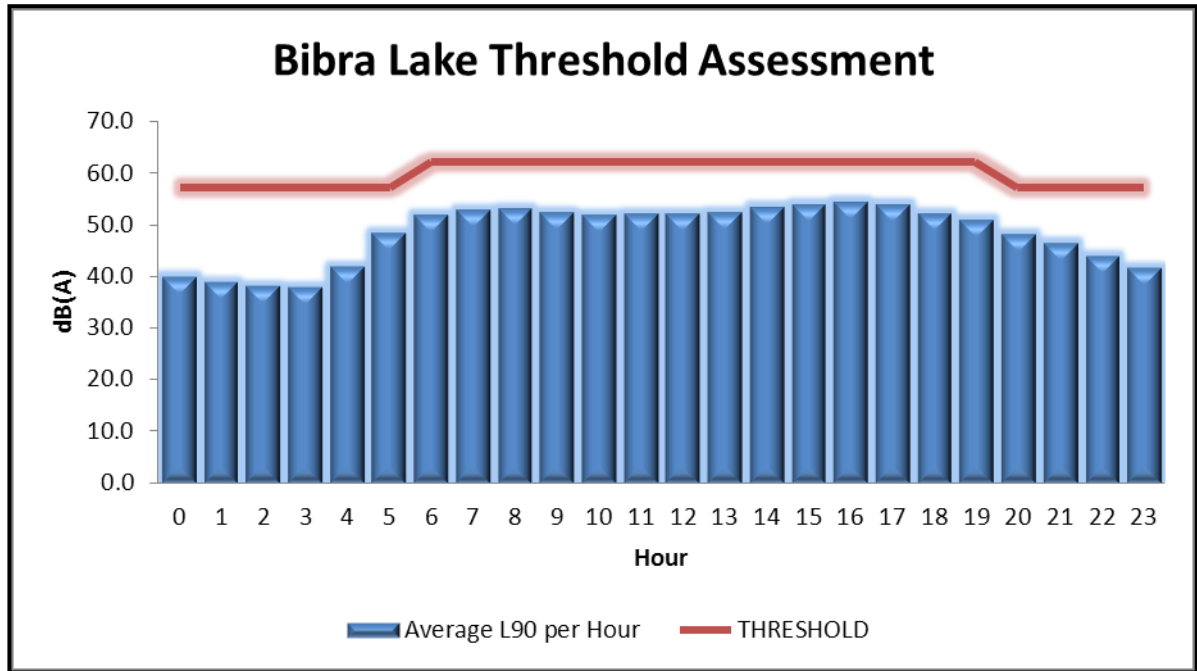
Airport	Jet	Turboprop	Light Propeller	Helicopter	Unknown*	Grand Total
<i>Jandakot</i>	43	243	313	105	659	1,363
<i>Perth</i>	26	16	6	3	0	51
<i>Other</i>	0	5	22	8	299	334
Grand Total	69	264	341	116	958	1,748

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

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 Jandakot 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	58.4
L _{Aeq} (night), dBA	52.5
Background Day (L ₉₀ dBA)	51.5
Background Night (L ₉₀ dBA)	40.9

Table 5 Correlated Noise Events Summary

	Jandakot Airport Movements	All Aircraft
Total number of Correlated Noise Events (CNE 24hr)	684	881
Number of Correlated Noise Events at night (CNE night)	11	18
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	559	725
CNE ₆₅ – night	5	8
CNE ₇₀ – day	162	200
CNE ₇₀ - night	1	1
CNE ₇₅ – day	32	35
CNE ₇₅ - night	0	0
CNE ₈₀ – day	8	8
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	3 to 34	4 to 44
CNE ₇₀	2 to 13	3 to 16
CNE ₇₅	0 to 4	0 to 5
CNE ₈₀	0 to 2	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	19.96	25.89
CNE ₆₅ Ave. – night	0.18	0.29
CNE ₇₀ Ave. – day	5.79	7.14
CNE ₇₀ Ave. – night	0.04	0.04
CNE ₇₅ Ave. – day	1.14	1.25
CNE ₇₅ Ave. – night	0.00	0.00
CNE ₈₀ Ave. – day	0.29	0.29
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 57-62dB(A) as depicted in Figure 5.

Table 6 LAmix Summary

Min dB(A)	Max dB(A)	Average dB(A)
57.9	91.3	67.9

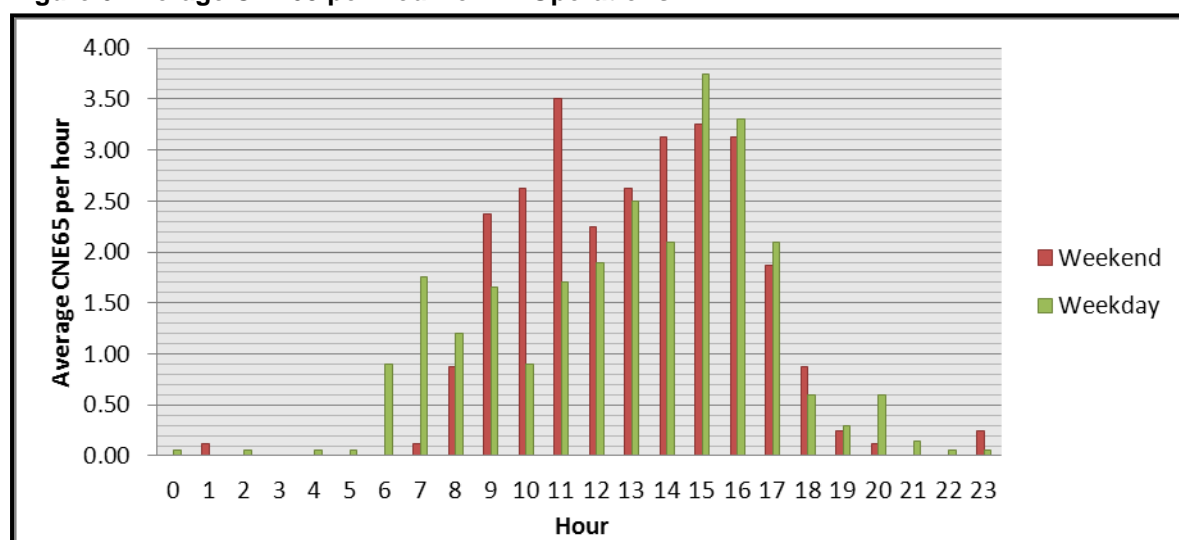
Note: Summary for operations that passed through the correlation zone (2.5km radius with 8,145ft height AGL)

CNE65 Count by Hour

A large number of noise events were between 65dB(A) and 70dB(A). Therefore further investigation was undertaken on the number of correlated noise events that exceed 65dB(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 65dB(A) or above (CNE₆₅) broken down on an hourly basis.

Figure 6 Average CNE65 per Hour for All Operations



The highest number of CNE₆₅ in any one hour throughout the reporting period was 10 on 26th November 2012 between 3pm and 4pm.

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 Bibra Lake EMU

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAmix dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Bell 412 (H)	Jandakot	A	H	1	79.3	79.3	1
Piper P32R (P)	Rottnest Island	D	27	1	76.3	76.3	1
GippsAero GA8 (P)	Jandakot	T	30	2	74.1	79.1	1
Bell 412 (H)	Jandakot	D	H	1	73.8	73.8	1
Fairchild Metroliner (T)	Jandakot	D	24R	16	73.8	80.3	2
Piper PA18 (P)	Jandakot	T	24R	1	73.0	73.0	1
Eurocopter BK117 (H)	Jandakot	A	H	2	73.0	73.8	1
Super King Air (T)	Perth	D	21	1	72.8	72.8	1
Beechcraft BE55 (P)	Jandakot	D	Unknown	1	72.8	72.8	1
Eurocopter AS350 (H)	Jandakot	A	Unknown	1	72.7	72.7	1

Table 8 Top 10 Most Correlated Aircraft Types Over the Bibra Lake EMU

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	LAm _{ax} dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Unknown (U)	Jandakot	A	24R	108	68.0	91.3	12
Unknown (U)	Unknown	O	Unknown	58	67.4	76.1	5
Unknown (U)	Jandakot	A	Unknown	49	68.9	77.4	8
Unknown (U)	Rottne _{st} Island	D	27	46	68.6	75.6	5
Unknown (H)	Jandakot	A	H	35	67.8	76.2	8
Unknown (U)	Jandakot	A	24L	33	67.5	74.6	4
Unknown (U)	Jandakot	A	12	31	68.6	78.9	10
Eurocopter BK117 (H)	Jandakot	T	H	27	67.5	75.3	5
Robinson R44 (H)	Jandakot	A	H	19	66.8	72.1	5
Pilatus PC12 (T)	Jandakot	D	24R	17	65.1	69.0	5

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

Conclusions

Following recommendations made in 'Review of the Perth Environmental Monitoring Units', Short Term Monitoring was conducted at Bibra Lake during the period of 10th November to 8th December 2012. Bibra Lake is located to the west of Jandakot Airport.

Throughout the reporting period the highest number of correlated aircraft noise events exceeding 65dB(A) in one day was 44. On November 26th during the period of 3pm and 4pm, 10 events exceeding 65dB(A) occurred, this was the greatest number in one hour during the period. Residents in the area of Bibra Lake were exposed to a correlated noise events exceeding 65dB(A) during the hours of day and night. There were 8 correlated noise events above 65dB(A) that occurred during the hours of night. The average LAm_{ax} during the reporting period was 67.9dB(A), with a max level of 91.3dB(A) and minimum level of 57.9dB(A) recorded.

Noise events above 65dB(A) were most common in the weekday hours of 3:00pm to 5:00pm and on weekends in the period of 11:00am to 5:00pm.

A review of Tables 7 and 8 indicates the most frequent and loudest aircraft types to pass over Bibra Lake are General Aviation aircraft operating to and from Jandakot Airport. There are a high number of non-flight planned operations that depart or arrive at Jandakot, for this reason the most frequent correlated aircraft types were dominated by Unknown movements.

The correlation summary of 43% is a reasonably low result. Whilst the noise created from aircraft may be noticeable, majority of operations flying nearby are not loud enough to create a noise event above the determined threshold settings.

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