

# **Short Term Monitoring Program**

## **Kingscliff 2 Report, NSW**

# Change Summary

Version 1: 18 Dec 2013		
Section/ Clause	Summary	NRFC

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## 1. Deployment Details

### 1.1 Deployment Purpose

Short term noise monitoring was conducted at Kingscliff following recommendations made by the community.

The noise monitor was located to the south of Gold Coast airport. During the reporting period the area was predominately traversed by Runway 32 arrivals. Due to the distinctive flight paths and distance from Gold Coast Airport, it is not expected the ratio of arrival and departure flights over Kingscliff will change due to seasonal variation over a twelve month period.

The purpose of this report is to provide a technical summary of the recorded aircraft noise and operational data collected at Kingscliff during September 2013.

An explanation of terms used within this report can be found in the Glossary at the end of the report.

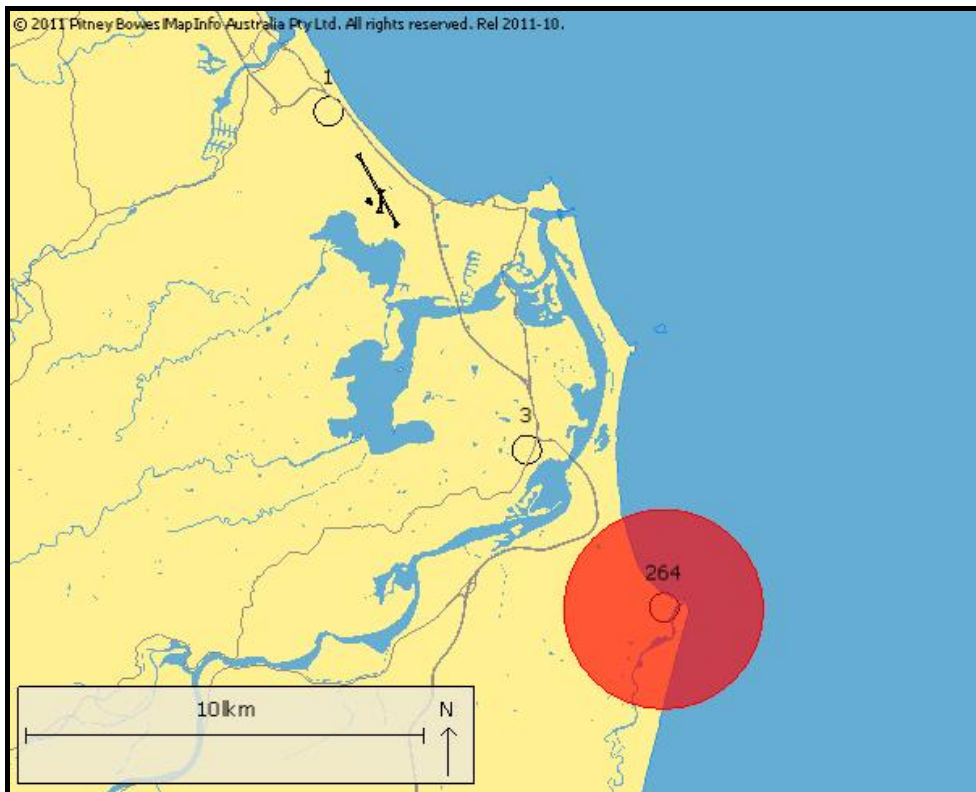
### 1.2 Deployment Monitoring Period

01/09/2013 12:00am – 01/10/2013 12:00am

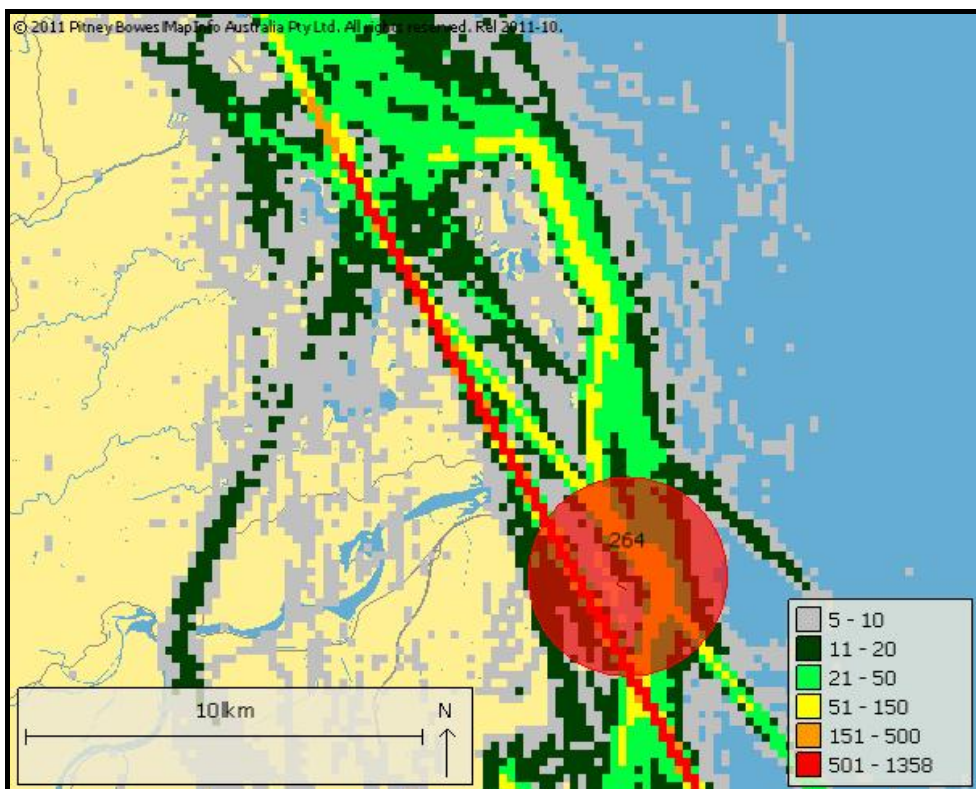
### 1.3 Noise Monitoring Terminal (NMT) Details

Location	Private Residence, Kingscliff, NSW 2487
Latitude	28°15'30.73"S
Longitude	153°34'45.80"E
NMT Altitude	98ft above mean sea level
Capture Zone	2.5km radius with 8,000ft (above ground level) height for noise data capture
Threshold Settings	55.0 dB(A) to 59.0 dB(A) depending on time of day

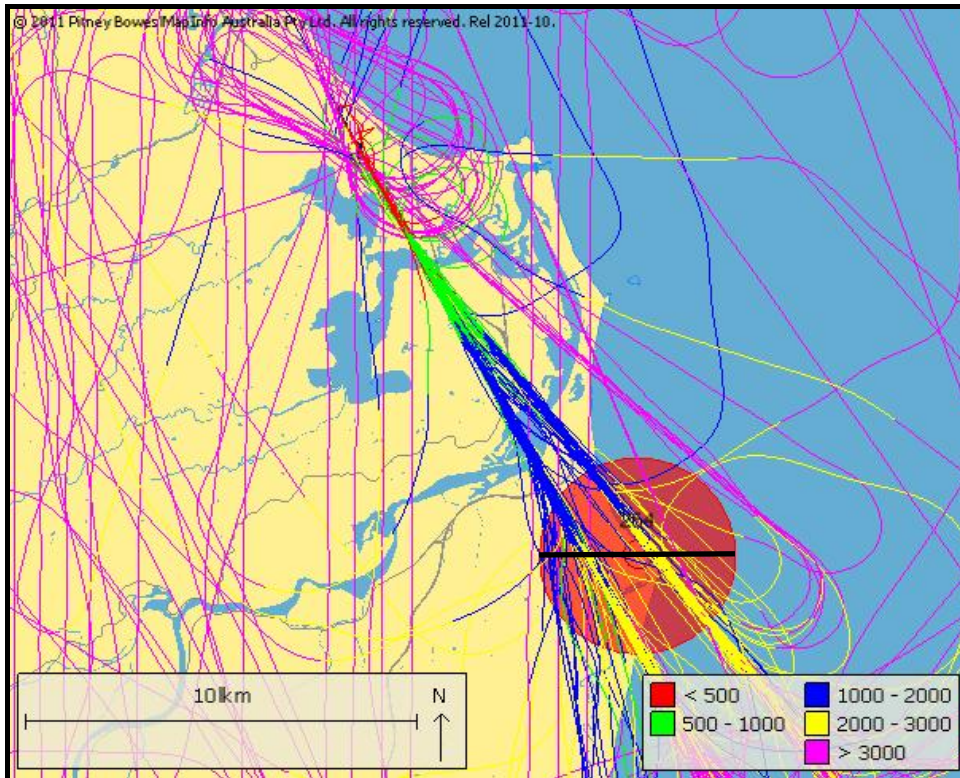
## 2. Location Images



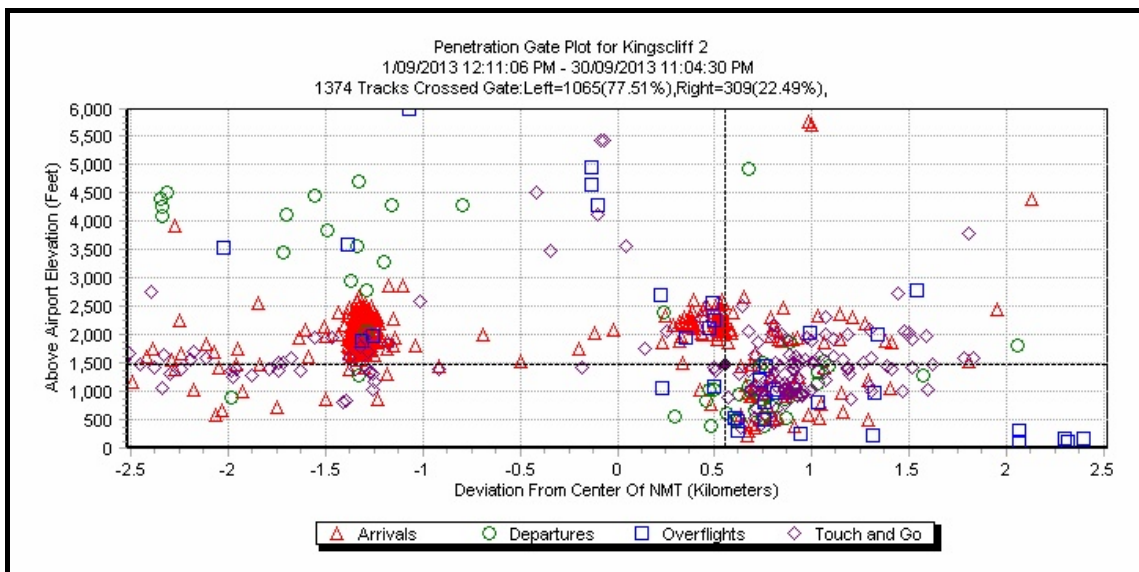
**Figure 1:** Gold Coast Fixed NMT Location and the Kingscliff 2 Short Term Monitoring Program Deployment Location



**Figure 2:** Total Movements Captured Track Density



**Figure 3:** Gold Coast Airport Runway 32 Arrival Movements Captured



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

**Note:** Gold Coast Airport is 21ft above mean sea level. NMT altitude is 98ft 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.



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### 3. Deployment Findings

The following tables present a summary of the operations data.

**Table 1 Movement Summary (01/09/2013 12:00am – 01/10/2013 12:00am)**

Type of Operation	Runway 32 Arrival Movements	All Movements
Number of Movements Through Capture Zone*	1,041	1,358
Number of Correlated Noise Events (CNE)	939	1,194
Number of Movements with Correlated Noise Events (CNE)	893	1,069
Correlation Summary	85.78%	78.72%

**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

Airservices analyses noise events and aircraft movements within the capture zone. 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 79% is considered to be a good 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	Max*	Average*
Departures Through Capture Zone**	7,806	2,391
Arrivals Through Capture Zone**	8,272	1,961
All Operations Through Capture Zone**	8,358	1,968

**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 Gold Coast Basin.

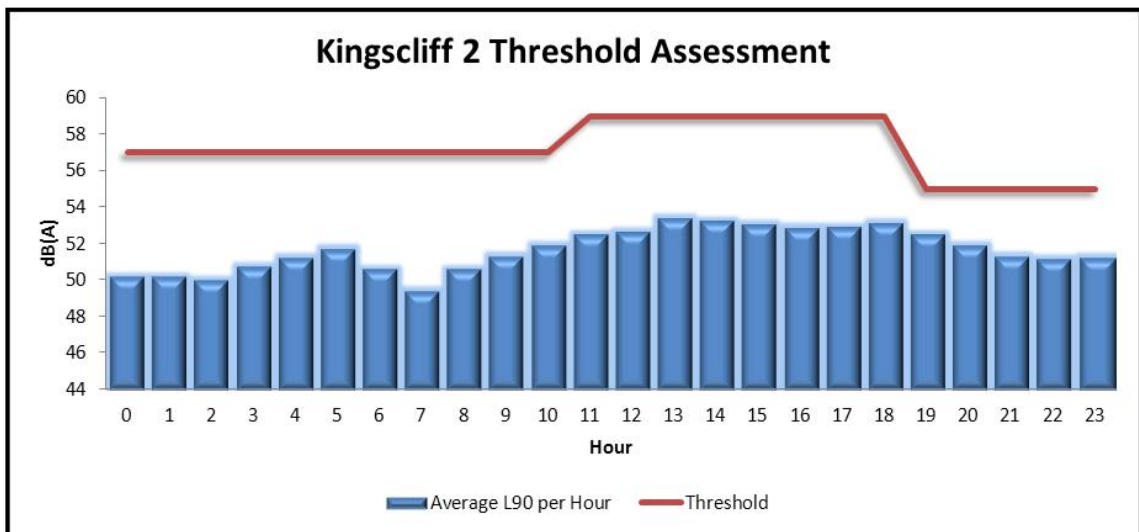
**Table 3 Captured Movements Breakdown By Airport and Aircraft Category**

Airport	Jet	Turboprop	Light Propeller	Helicopter	Unknown*	Grand Total
Gold Coast	1,000	34	189	69	0	1,292
Other	9	4	30	20	3	66
<b>Grand Total</b>	<b>1,009</b>	<b>38</b>	<b>219</b>	<b>89</b>	<b>3</b>	<b>1,358</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 Gold Coast Runway 32 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)	56.6
LAeq (night), dB(A)	54.9
Background Day (L90 dB(A))	51.8
Background Night (L90 dB(A))	50.5

**Table 5 Correlated Noise Events Summary**

	Runway 32 Arrival Movements	All Aircraft
Total number of Correlated Noise Events (CNE 24hr)	939	1,194
Number of Correlated Noise Events at night (CNE night)	5	5
Operational Days	30	30
Number of Correlated Noise Events (CNE <sub>xx</sub> ) day/night	CNE <sub>xx</sub>	CNE <sub>xx</sub>
CNE <sub>60</sub> – day	870	1,086
CNE <sub>60</sub> - night	5	5
CNE <sub>65</sub> – day	283	374
CNE <sub>65</sub> – night	1	1
CNE <sub>70</sub> – day	48	74
CNE <sub>70</sub> - night	0	0
CNE <sub>75</sub> – day	5	9
CNE <sub>75</sub> - night	0	0
CNE <sub>80</sub> – day	0	1
CNE <sub>80</sub> - night	0	0



<b>Number of Correlated Noise Events (CNExx) per 24hr period min – max</b>	<b>Runway 32 Arrival Movements</b>	<b>All Aircraft</b>
CNE <sub>60</sub>	0 to 64	2 to 74
CNE <sub>65</sub>	0 to 30	1 to 33
CNE <sub>70</sub>	0 to 9	0 to 9
CNE <sub>75</sub>	0 to 3	0 to 3
CNE <sub>80</sub>	0 to 0	0 to 1
<b>Average Number of Correlated Noise Events (CNExx Ave.) day/night</b>	<b>CNExx Ave.</b>	<b>CNExx Ave.</b>
CNE <sub>60</sub> Ave. – day	29.00	36.20
CNE <sub>60</sub> Ave. – night	0.17	0.17
CNE <sub>65</sub> Ave. – day	9.43	12.47
CNE <sub>65</sub> Ave. – night	0.03	0.03
CNE <sub>70</sub> Ave. – day	1.60	2.47
CNE <sub>70</sub> Ave. – night	0.00	0.00
CNE <sub>75</sub> Ave. – day	0.17	0.30
CNE <sub>75</sub> Ave. – night	0.00	0.00
CNE <sub>80</sub> Ave. – day	0.00	0.03
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**

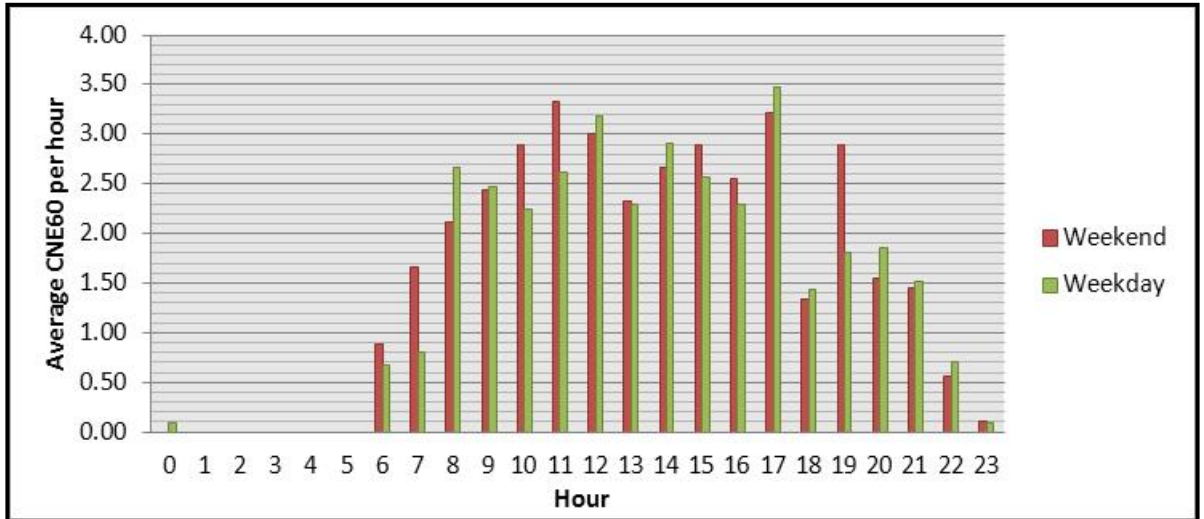
<b>Min dB(A)</b>	<b>Max dB(A)</b>	<b>Average dB(A)</b>
56.6	85.8	64.0

**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 11. This occurred between 5pm and 6pm on September 24<sup>th</sup>.

## 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 (L<sub>Amax</sub>) at the Kingscliff 2 Noise Monitoring Terminal**

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	L <sub>Amax</sub> dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Sikorsky S-76 (H)	Tyagarah	D	H	1	85.8	85.8	1
Eurocopter Tigre (H)	Amberley	O	Unknown	1	79.8	79.8	1
Cessna C172 (P)	Gold Coast	A	32	2	75.6	78.2	2
Cicare Ch-7B (H)	Coffs Harbour	O	Unknown	1	73.6	73.6	1
AS-365 Dauphin 2 (H)	Southport	D	H	1	73.2	73.2	1
Eurocopter AS-350 (H)	Southport	D	H	1	73.0	73.0	1
Cirrus SR22 (P)	Port Macquarie	O	Unknown	2	73.0	74.9	2
McDonnell Douglas F/A-18 Hornet (J)	Amberley	O	Unknown	1	72.8	72.8	1
Unknown (U)	Unknown	O	Unknown	1	72.2	72.2	1
Boeing 777-200 (J)	Gold Coast	A	32	7	71.7	74.8	1

**Note:** As shown above, Kingscliff 2 is traversed by movements that do not depart or arrive at Gold Coast Airport.

**Table 8 Top 10 Most Correlated Aircraft Types Over the Kingscliff 2 Noise Monitoring Terminal**

Aircraft Type	Airport	Operation Type	Runway	No. Correlated Noise Events	L <sub>Amax</sub> dB(A)		Highest No. CNE in One Day
					Average	Maximum	
Airbus A320 (J)	Gold Coast	A	32	440	64.1	79.3	30
Boeing 737-800 (J)	Gold Coast	A	32	305	63.7	77.1	21
Airbus A321 (J)	Gold Coast	A	32	65	63.7	72.8	5
Robinson R44 (H)	Gold Coast	T	H	58	63.3	77.5	11
Embraer 190 (J)	Gold Coast	A	32	37	62.3	69.8	4
Robinson R22 (H)	Gold Coast	T	H	23	62.7	74.5	8
Airbus A330-200 (J)	Gold Coast	A	32	17	65.8	72.1	2
Fairchild Metroliner (T)	Gold Coast	A	32	10	60.5	65.2	2
Diamond DA42 (P)	Gold Coast	A	32	10	62.6	72.8	2
Piper PA-31 Navajo (P)	Gold Coast	T	32	9	61.9	64.9	2
Airbus A330-300 (J)	Gold Coast	A	32	9	70.4	71.8	1
Cessna C152 (P)	Gold Coast	T	14	9	64.8	72.4	3
Cessna C172 (P)	Gold Coast	T	14	9	63.2	73.0	3

**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)

**Note:** 13 aircraft shown in table 8 due to equal 10<sup>th</sup> most correlated aircraft type.

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## Conclusions

Short term noise monitoring was conducted in Kingscliff during the period of September 1<sup>st</sup> to October 1<sup>st</sup> 2013. This followed recommendations made by the community. The most common aircraft movements to traverse the Kingscliff are Gold Coast Regular Public Transport (RPT) Runway 32 arrivals.

Throughout the reporting period the highest number of correlated aircraft noise events exceeding 70dB(A) in one day was 9.

The highest number of CNE60 in any one hour throughout the reporting period was 11. This occurred between 5pm and 6pm on September 24<sup>th</sup>. Residents in the area of Kingscliff were exposed to correlated noise events exceeding 75dB(A) during the day. There was 5 correlated noise events above 60dB(A) that occurred during the hours of night. The average correlated LAmax during the reporting period was 64.0dB(A), with a max level of 85.8dB(A) and minimum level of 56.6dB(A) recorded.

Correlated noise events above 60dB(A) were most common during the weekend hours of 11:00am to 12:00pm and both the weekday and weekend hours of 5:00pm to 6:00pm.

A review of Table 7 indicates that generally the loudest correlated aircraft noise events residents of Kingscliff experience are helicopter movements.

The correlation summary of 79% for all movements is considered a good result based on reviews of fixed noise monitoring terminals nationally. During the reporting period Gold Coast Runway 32 arrivals had a correlation summary of 86%.

Due to the distinctive flight paths and distance from Gold Coast Airport, it is not expected the ratio of arrival and departure flights over Kingscliff will change due to seasonal variation over a twelve month period.

## 6. 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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## 7. 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 ACT 1460.

## 8. 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)
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
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.