



## Investigation Report July 2016

### **SACF Action 2016 01/01:**

**Airservices to conduct a high level, preliminary investigation into the issues and feasibility around potential changes to the flight path over Katoomba.**

### **Proposal**

Airservices to conduct a high level, preliminary investigation into the issues and feasibility around potential changes to the flight path over Katoomba. This investigation will consider safety, efficiency and environmental impacts to the extent required.

### **Proposal originators**

SACF

### **Background**

Katoomba waypoint is located over a Non Directional Beacon (NDB) which is one of the radio navigation aids used for many years to ensure aircraft were kept on predictable flight paths. The routes that aircraft follow were traditionally aligned to radio navigation aids.

Katoomba waypoint has been used as a tracking point for aircraft departing Runway 34L and Runway 16R from Sydney to the west for many years. It provides flight path tracking that allows outbound aircraft to avoid Richmond military restricted airspace to the north-west and to avoid inbound aircraft arriving into Sydney via Bindook to the south-west.

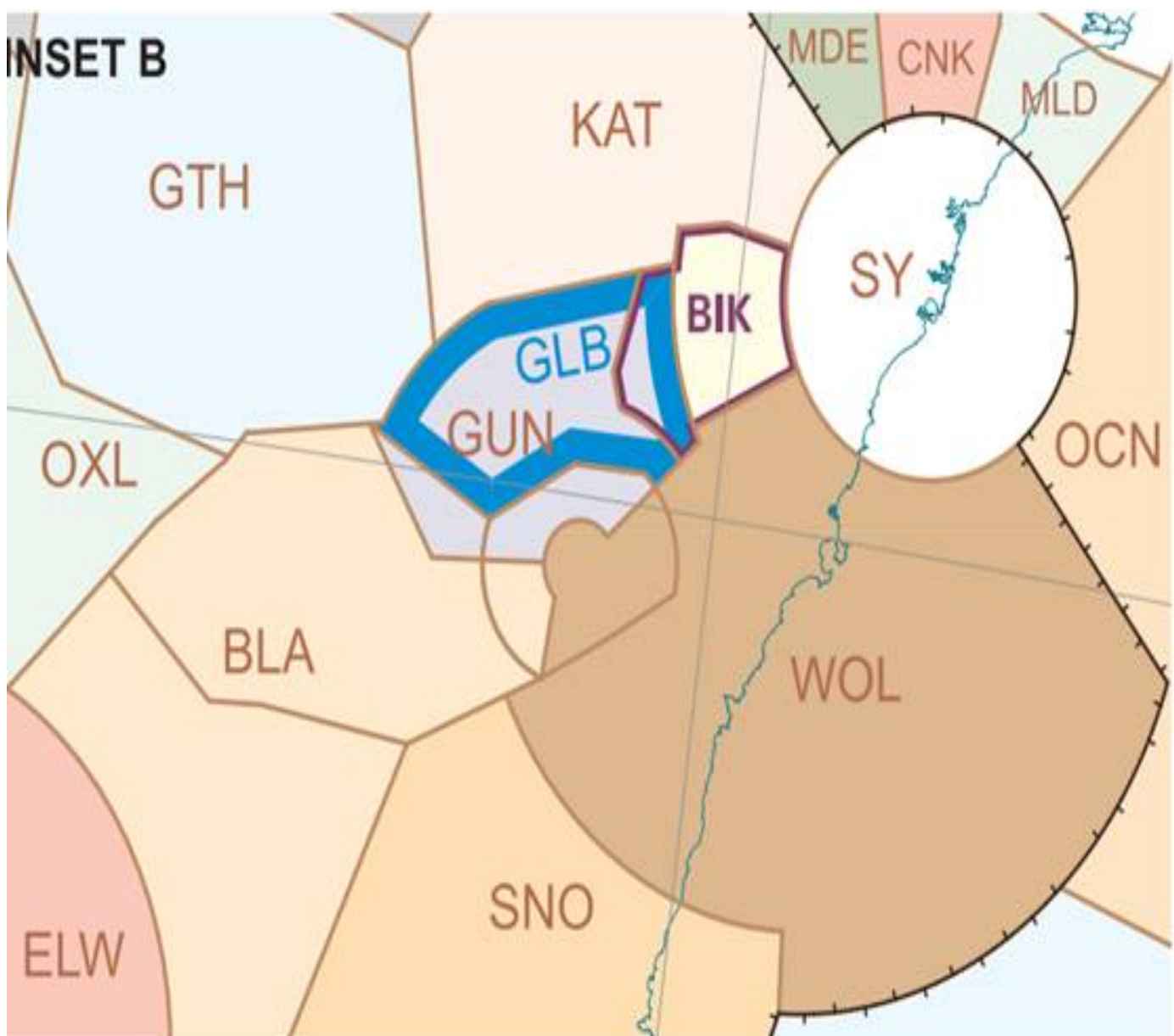
Air traffic control must have inbound and outbound routes which are sufficiently spaced to ensure safe separation between aircraft as shown on Map 1 below:



Airspace is divided into air traffic control “sectors”. Each sector is the area of responsibility for a different air traffic controller. This allows the responsibilities for each air traffic controller to be clearly defined. Routes are contained within sectors and, in this case, outbound and inbound routes are segregated so that each is contained in separate sectors.

KAT is the sector aligned with Katoomba waypoint and associated outbound routes, BIK is the sector aligned with Bindook waypoint and associated inbound routes.

These sectors are illustrated in map 2 below:



Map 2: Air Traffic Control Sectors to contain routes

## **Investigation**

### **Safety and Efficiency:**

Katoomba waypoint is overflown by aircraft departing Runway 34L and Runway 16R to the north-west.

Airspace to the north-west of Sydney Airport is defined by Military Restricted areas, particularly those that support military flying activity at Richmond, and airspace sector boundaries established for segregation of air traffic.

Airspace sectors are established to enable air traffic controllers to separate aircraft within their sectors of airspace without having to consider aircraft in other sectors. This reduces complexity and coordination and therefore ensures safe operations.

Sectors are designed to contain routes with a minimum number of conflict points where tracks cross or coordination between controllers may be required.

Airspace sector boundaries are positioned to ensure that routes like the departure route over Katoomba are contained within specific air traffic control sectors of responsibility.

There are also a number of inbound routes into Sydney from the west and these must remain segregated from the departure route over Katoomba.

The current design ensures that aircraft departing from Sydney via the Katoomba waypoint remain outside the Richmond restricted areas and inside the established air traffic control KAT sector, ensuring that they are segregated from arriving and crossing traffic.

The existing position of Katoomba waypoint is critical to ensuring that the routes are contained within the existing air traffic control sectors.

### **Potential changes to Departure flight paths over Katoomba:**

As illustrated in Map 1, Richmond airspace is just to the north of the departure flight path via Katoomba and precludes moving the waypoint further north. The Katoomba waypoint position provides just enough separation with the restricted airspace, allowing aircraft to remain clear of military activity.

Movement of the departure flight path via Katoomba further south is not feasible as it would not remain within existing air traffic control sector boundaries illustrated in Map 2, and would not maintain segregation with other flight paths, resulting in increased complexity and reduction in safety.

Safety must always be the primary consideration for Airservices, flight path changes cannot be made if they result in reduced safety.

Moving sector boundaries to accommodate a flight path change is also not a feasible or practical option. Sector boundaries cannot be easily moved without affecting other sectors and the routes within them. This would require a broader re-design of the airspace. Further, because each sector corresponds to the area of responsibility for an air traffic controller, any change to sector boundaries would require comprehensive re-training. This would have significant time and cost implications.

### **Environment:**

#### **Noise Impacts for relocation of Katoomba waypoint:**

Existing noise levels in the Katoomba area are below 60dBA based on the altitudes and aircraft types captured in the Flight Data Analysis – see APPENDIX.

Any movement of Katoomba waypoint will result in moving the flight path over communities to the west of Sydney.

This is likely to expose new residents closer to Sydney Airport with noise impacts above 60dBA (the threshold considered for night time noise intrusion). Airservices considers holistically the effect on the community of any proposed flight path changes for the purposes of making noise improvements. Moving noise from one part of the community to another is not considered to be an overall noise improvement.

### **Investigation Conclusion:**

Given the constraints of military airspace restrictions, air traffic control sector boundary requirements, and route segregation requirements, moving the Katoomba waypoint for departing aircraft would adversely impact on safety and is not considered operationally feasible.

Any movement of the Katoomba waypoint and subsequent flight path changes would impact on communities closer to Sydney Airport at noise levels greater than 60dBA and would not be considered a noise improvement.

## **APPENDIX: Flight Data Analysis – Departures over Katoomba**

To evaluate the types and altitudes of aircraft overflying Katoomba, data was accessed from the Airservices Noise and Flight Path Monitoring System for the middle months of each season over the past 5 years as an appropriately extensive and indicative sample.

This data illustrates which aircraft are departing using this flight path, how that may have changed over time, and what altitudes aircraft are now at when passing over Katoomba. Indicative noise levels are then determined for the loudest and lowest aircraft.

### **Timeframe for data capture**

The months of January, April, July and October were selected as they are the middle months of each season.

Data from these months were collected for 2012 – 2015. For 2016, only the months of January and April are included.

### **Image Map features**

Katoomba NDB labelled and marked by a blue cross.

Circle lines spaced 20NM from Sydney Airport.







Various Blue Mountain suburbs are coloured.

Bankstown Airport Control Zone, SFC – 1500, is shaded blue.

Richmond restricted area represented in red.

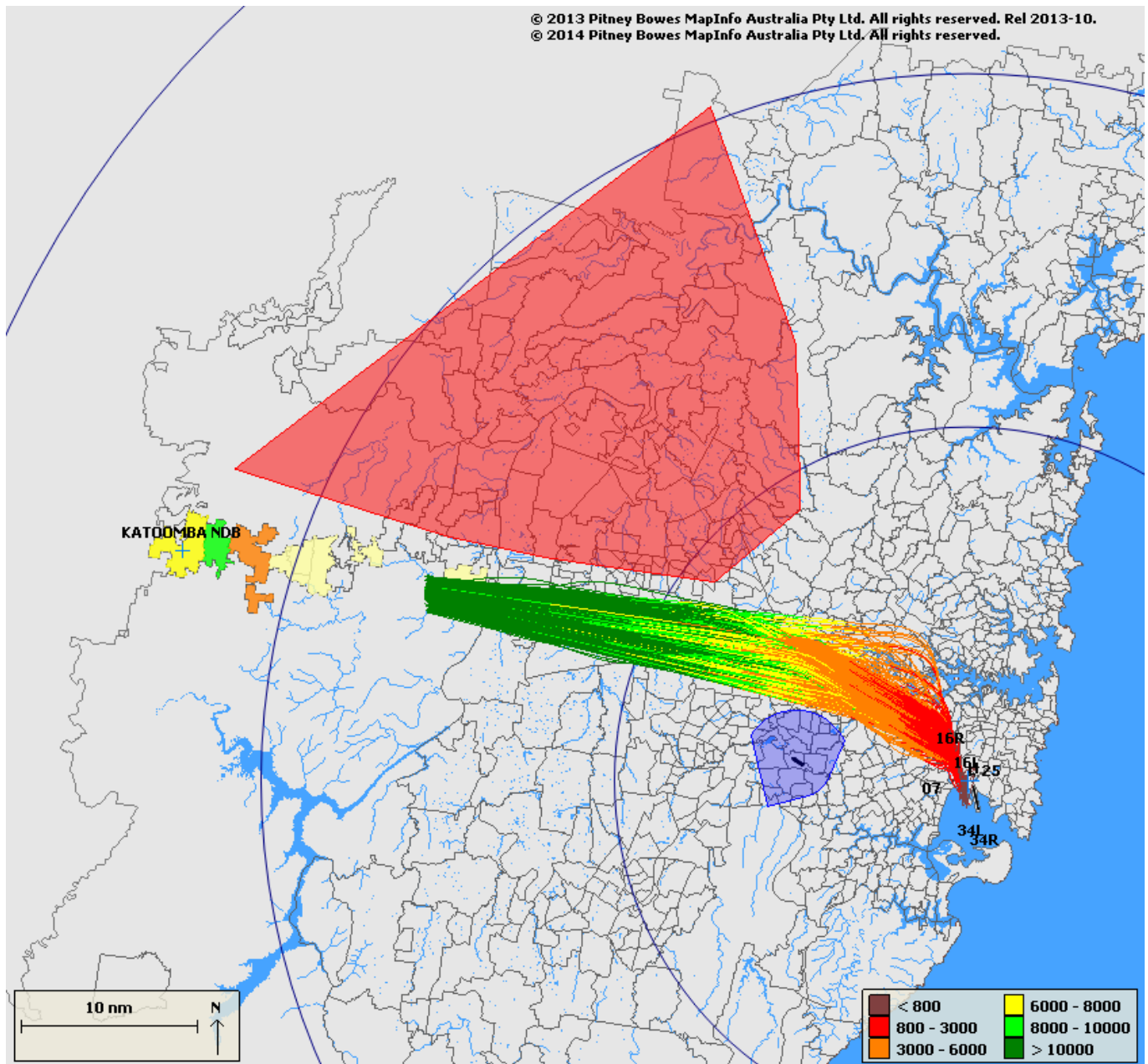
### **Track display**

The aircraft tracks are displayed by altitude and are only captured to the extent of the Noise and Flight Path Monitoring System ability. The track colour changes at different altitudes. The altitude is shown in feet above airport elevation of 21 feet and shows that all aircraft are at an altitude of at least 10,000ft before reaching Katoomba:

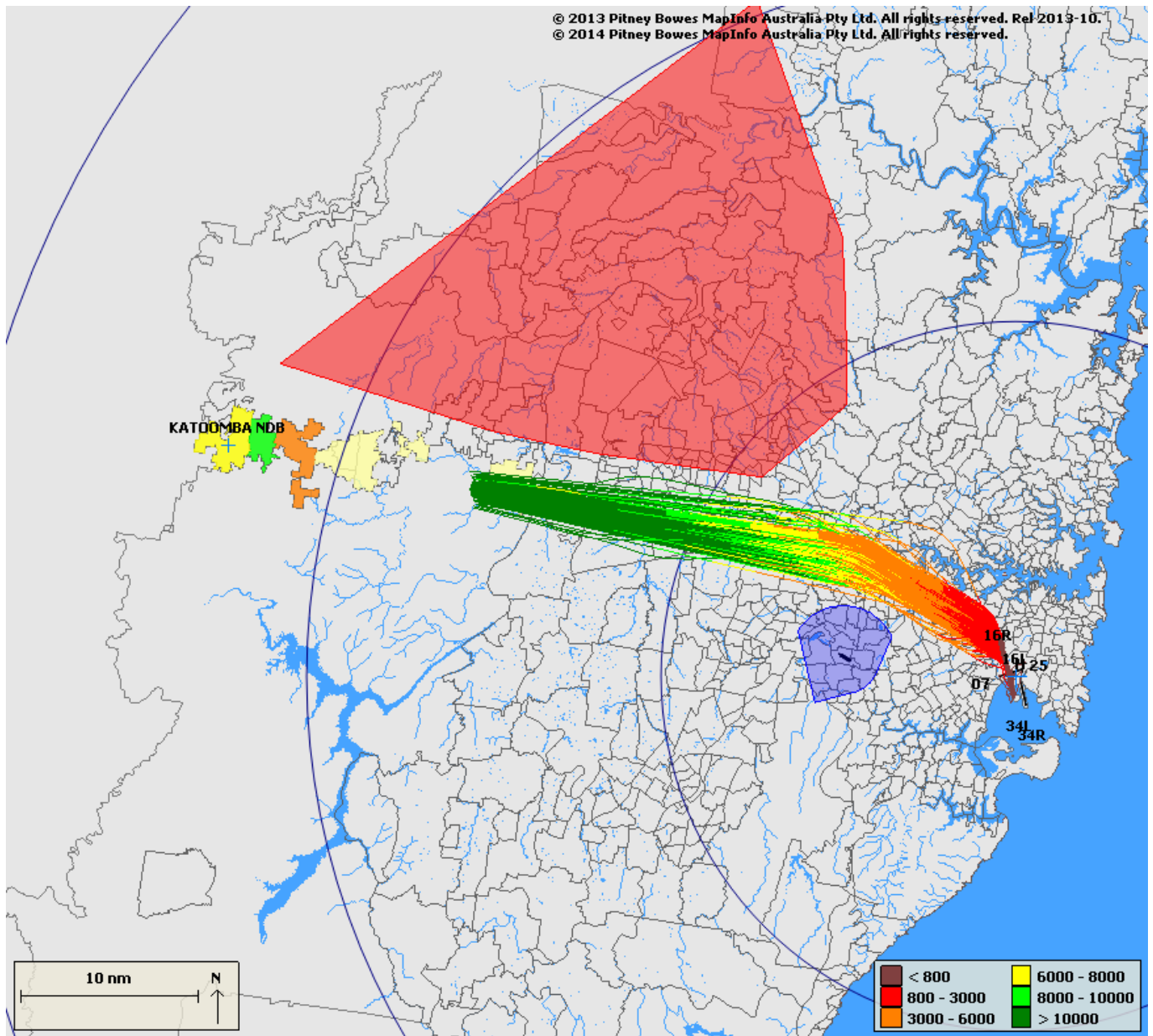
	< 800		6000 - 8000
	800 - 3000		8000 - 10000
	3000 - 6000		> 10000

# Image 1

Image 1 shows all tracks captured from 2012-2016.

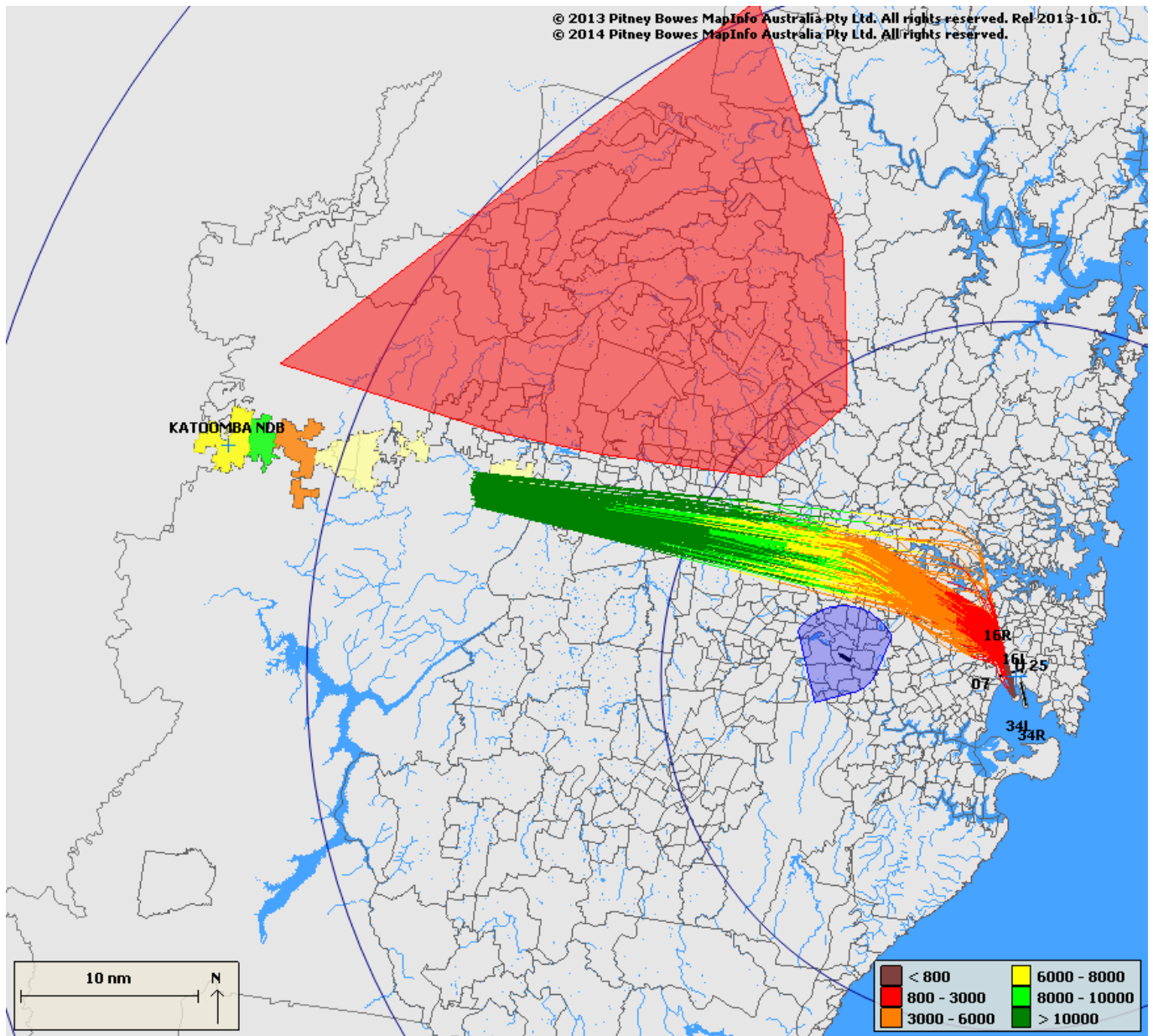


**Image 2**  
2012 tracks

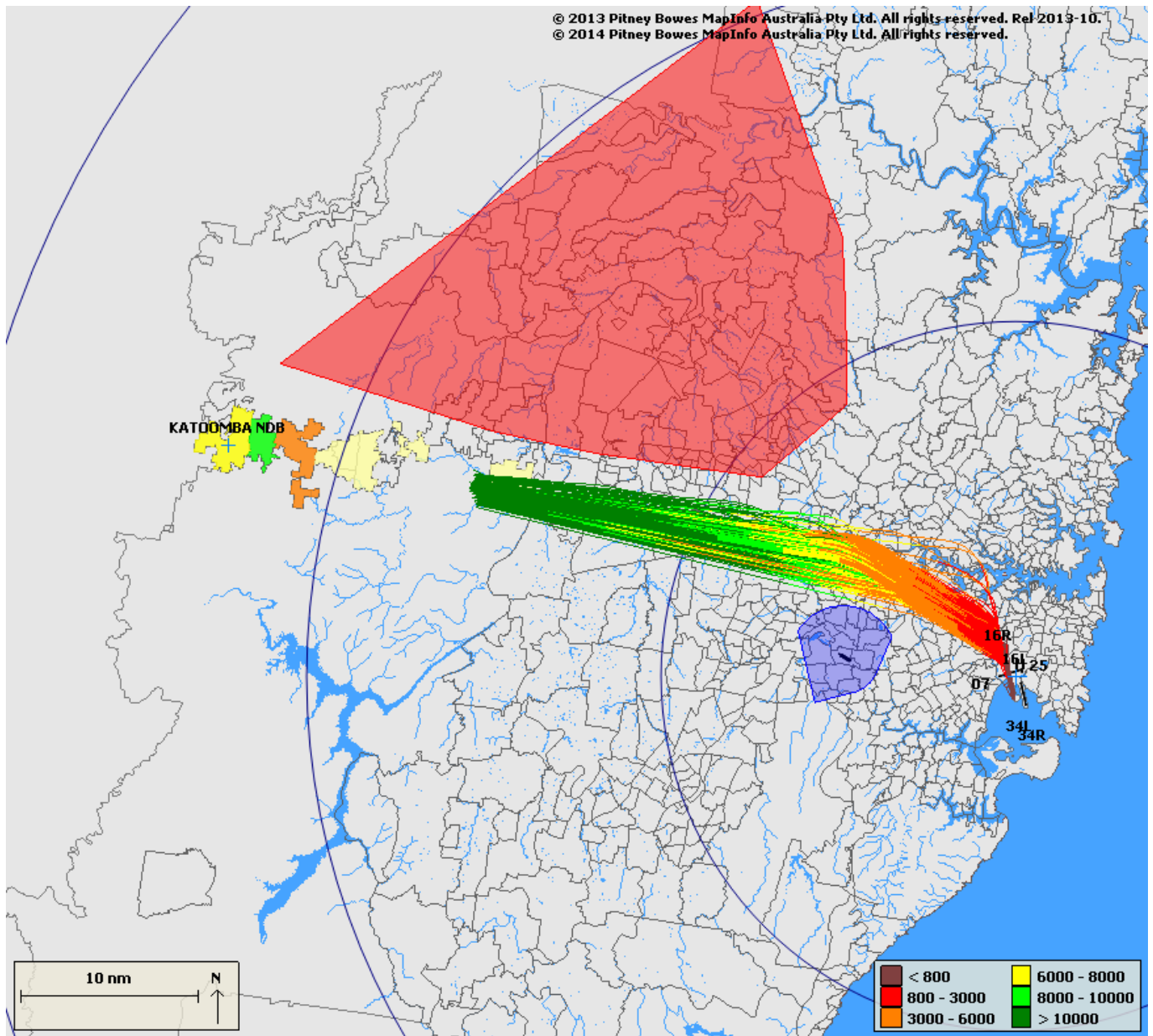




**Image 3**  
2013 tracks



**Image 4**  
2014 tracks



**Image 5**  
2015 tracks

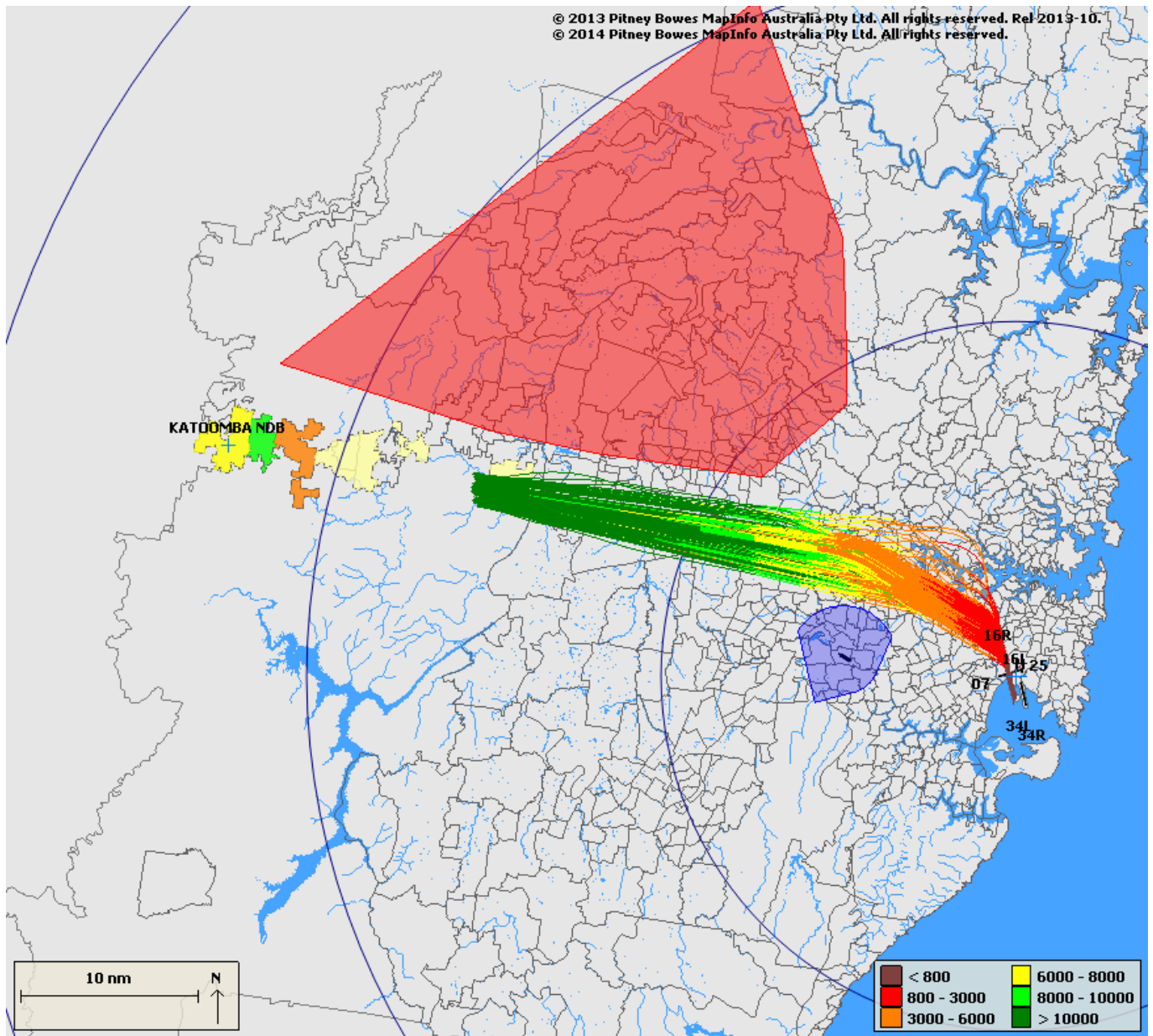
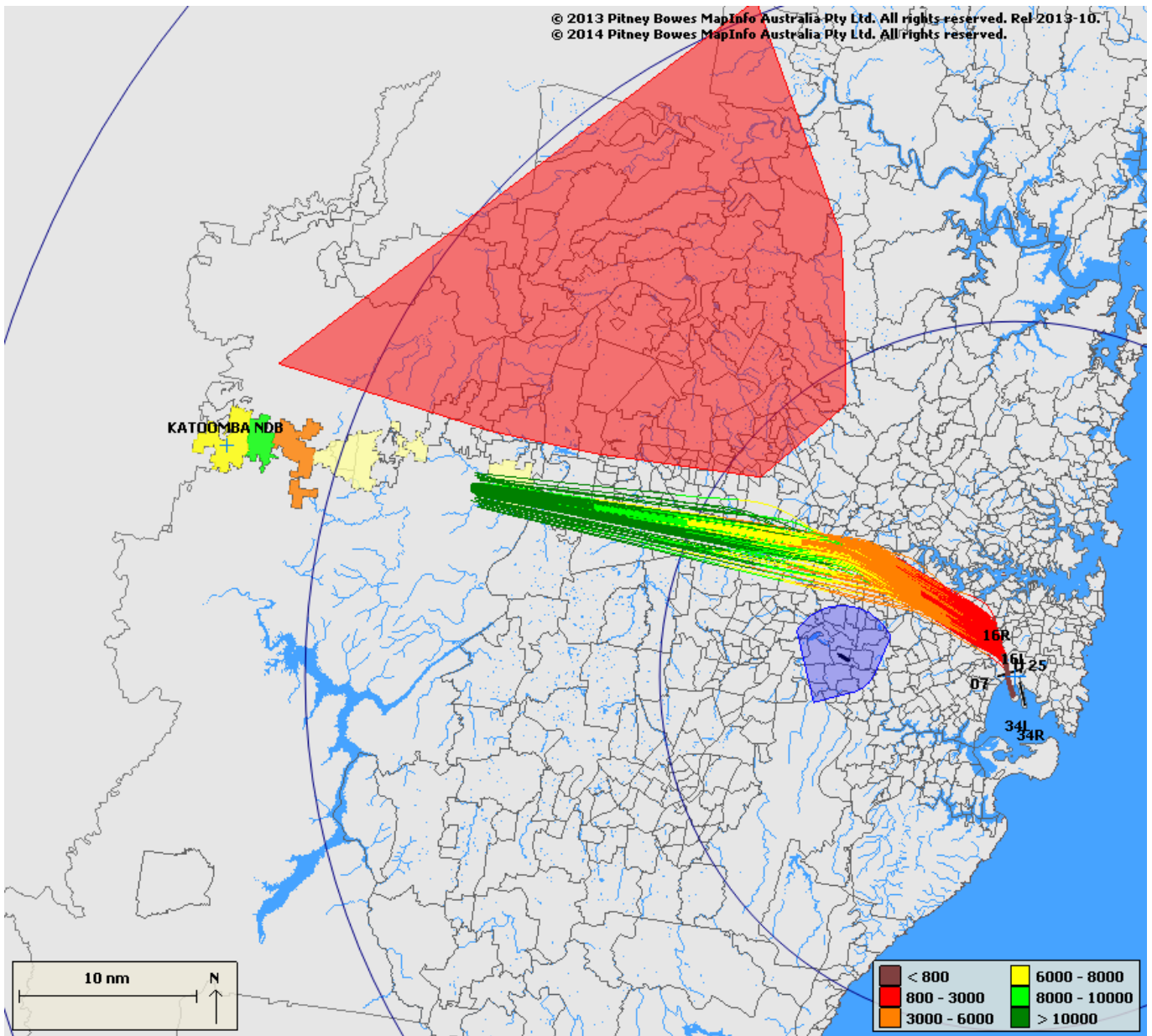


Image 6  
2016 tracks

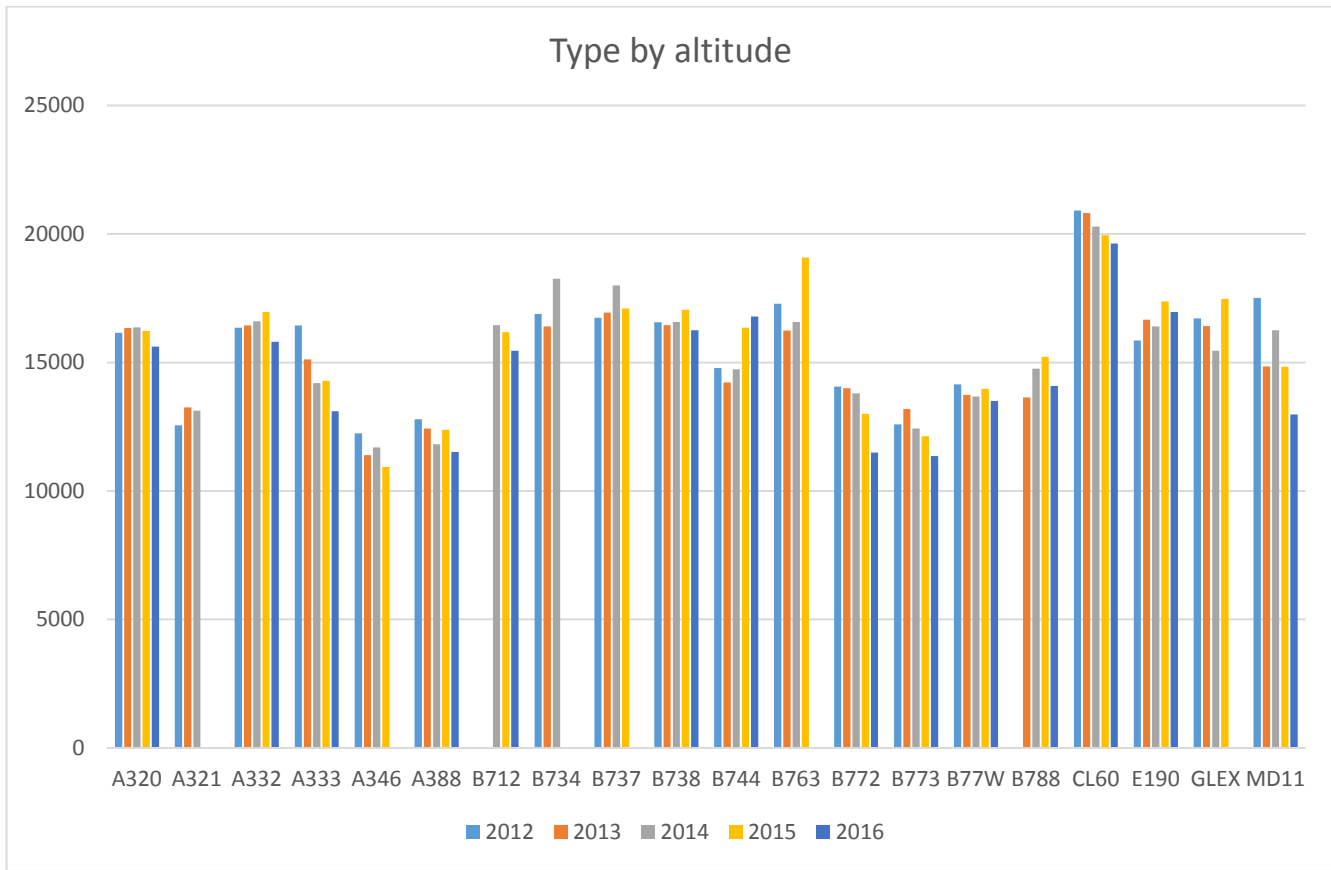


The table below shows % of overall departures attributed to aircraft type for January and April 2016

<b>Aircraft Type</b>	<b>Jan and April 2016</b>
B738	37%
A320	18%
A332	18%
A333	9%
A388	7%
B712 B744 B772 B773 B77W B788 CL60 E190 MD11	11%

The following table shows aircraft types with average altitude by year:

*Note: Data for 2016 excludes July and October and shows January and April only						
<b>Aircraft Type</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016*</b>	<b>Grand Total</b>
A320	16151	16339	16372	16233	15621	16234
A321	12552	13249	13128			13157
A332	16357	16439	16604	16965	15801	16554
A333	16439	15123	14201	14290	13099	14591
A346	12247	11399	11693	10939		11826
A388	12786	12424	11817	12381	11519	12264
B712			16453	16183	15457	16241
B734	16894	16404	18257			16724
B737	16737	16941	17995	17103		17227
B738	16564	16455	16573	17050	16253	16622
B744	14787	14222	14740	16355	16792	14982
B763	17287	16244	16582	19087		17013
B772	14068	13997	13802	13008	11499	13733
B773	12594	13187	12429	12134	11362	12581
B77W	14155	13738	13673	13979	13498	13827
B788		13632	14760	15219	14087	14860
CL60	20918	20816	20292	19959	19632	20340
E190	15861	16661	16404	17379	16965	16643
GLEX	16720	16421	15460	17475		16639
MD11	17516	14847	16251	14830	12974	15575
<b>Grand Total</b>	<b>16036</b>	<b>15819</b>	<b>15902</b>	<b>16092</b>	<b>15314</b>	<b>15911</b>



**Summary of data analysis:**

Note that 2016 figures are for two months rather than the four months collected in other years.

**Aircraft types:**

The most flown aircraft types over Katoomba from Runway 34L departures during the period captured were B738, A330 and A320.

**Altitudes:**

Average altitudes for all aircraft appear to be consistent during the 2012-2016 period captured at between 15,300 and 16,100 ft.

The lowest altitude during the entire period captured was 10,939 ft attributed to an A340 600.

In the two months data collected for 2016 the following average altitudes were captured for the most used aircraft types, with the lowest average altitude of 11,360 feet captured for the B777 300.

A320 – 18% of total departures – average 15,600ft  
 B738 – 37% of total departures – average 16,200ft

A332 – 18% of total departures – average 15,800ft  
A333 – 9% of total departures – average 13,100ft  
A388 – 7% of total departures – average 11,500ft

**Existing Noise Impacts:**

Airservices Noise and Flight Path Monitoring System does not currently provide noise levels for flights over Katoomba. Noise modelling does not provide indicative noise levels at the aircraft altitudes captured over Katoomba as the modelling is based on noise levels of 60dBA and above which is the threshold considered for night time noise intrusion. Airservices acoustics engineers verify that noise levels for aircraft type and levels captured for this analysis would be below 60dBA.