

> Aircraft Noise



Bankstown Airport

Master Plan
2004/05



> Aircraft Noise

24.1 Why Is Aircraft Noise Modelled?

Modelling of the noise impact of aircraft operations has been undertaken as part of this MP. Such modelling is undertaken for a three primary reasons as follows:

- Australian Noise Exposure Forecasts (ANEFs) are a required part of an Airport Master Plan under the Airports Act, 1996;
- to assist the community to understand the noise impacts associated with the 20 year aircraft movement traffic forecast included in the MP; and
- to assist in land use planning.

ANEFs play a major role in land use planning in communities surrounding airports. The role of noise modelling in land use planning is described in Australian Standard AS2021 which advises on the acceptability of building sites for various uses based on ANEF zones. The key impacts of Australian Standard AS2021 are set out in Table 8.

Table 8
Building Type Acceptability in ANEF Zones

This Table is an extract of Table 2.1 in Australian Standards AS 2021-1994, Acoustics – Aircraft Noise Intrusion – Building Siting and Construction, and any reference made are to Clauses, Tables and Appendices contained within this Standard.

Building Type	Acceptable	Conditional	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF1	20 to 25 ANEF2	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF1	20 to 25 ANEF2	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF1	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF1	20 to 30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

Note 1: The actual location of the ANEF contour is difficult to define accurately, mainly because of variation in aircraft flight paths. Because of this, the procedure of Clause 2.3.2 may be followed for building sites outside but near to the 20 ANEF contour.

Note 2: Within 20 to 25 ANEF some people may find that the land is not compatible with residential or educational uses. Land use authorities may consider that the incorporation of noise control features in the construction of residences or schools is appropriate (see also Figure A1 of Appendix A).

Note 3: There will be cases where a building of a particular type will contain spaces used for activities which would generally be found in a different type of building (eg an office in an industrial building). In these cases, Table 2.1 (above) should be used to determine site acceptability but internal design noise levels within the specific spaces should be determined by using Table 3.3.

Note 4: The Standard does not recommend development in unacceptable areas. However, where the relevant planning authority determines that any development may be necessary within existing built-up areas designated as unacceptable, it is recommended that such development should achieve the required ANR determined according to Clause 3.2. For residences, schools etc., the effect of aircraft noise on outdoor areas associated with the buildings should be considered.

Note 5: In no case should new development take place in Greenfield sites deemed unacceptable because such development may impact airport operations.

> Aircraft Noise

24.2 Statutory Requirements & Beyond

The Airports Act 1996 requires a MP to specify forecasts relating to noise exposure levels (see Section 71 – Contents of Draft or Final Master Plan of the Airports Act 1996).

The Commonwealth Government has accepted the utilisation of the ANEF methodology for the prediction of aircraft noise exposure and hence a draft ANEF is provided as part of this MP.

In addition to the provision of ANEFs, BAL has also conducted additional noise modelling in order to assist the community and airport stakeholders better understand the impact of aircraft noise. There are two aspects of additional modelling conducted as follows:

- use of a terrain modelling with ANEF modelling – a terrain model allows the noise modelling to take into account height variations in the land surrounding the airport, relative to the height of aircraft. The use of terrain models assists to improve the accuracy of ANEF contours; and
- use of N60 modelling – although not a formal requirement under the Airports Act 1996, a recent DoTaRS paper entitled Guidance Material for Selecting and Providing Aircraft Noise Information, recommended that GA airports such as Bankstown Airport also use noise metrics based on the number of aircraft noise events to assist the community to better understand the impacts of aircraft noise. Consequently, in response to DoTaRS' recommendation, BAL also commissioned N60 modelling of noise impacts as part of this MP.

24.3 Methodology

The noise modelling methodology adopted in this Preliminary Master Plan involves the use of the Integrated Noise Model (INM) to prepare both ANEF Contours and N60 maps. The INM model, ANEFs and N60s are described in further detail below.

24.3.1 Integrated Noise Model

The aircraft noise modelling conducted as part of this MP was prepared using the US Federal Aviation Administration (FAA)'s Integrated Noise Model (INM) computer program version 6.1.

The INM has been the FAA's standard tool for aircraft noise prediction in the vicinity of airports since 1978 and has been continuously refined over time to improve the accuracy of noise impact prediction. The INM calculates noise impacts by applying standard or user defined aircraft flight profiles, performance data and noise curves to specific runway configurations and flight tracks. The time of day at which operations take place is also factored into the noise computation. This allows for varying sensitivity in people's reaction to noise.

For this MP the model was set to produce two forms of output:

- Australian Noise Exposure Forecasts (ANEFs); and
- N60 contour maps.

These model outputs are described below.

In interpreting the outputs of the model, it should be noted that:

- aircraft movements are allocated as either a day (7:00am to 7:00pm) or a night operation (7:00pm to 7:00am);
- the number of approach and departure operations modelled relate directly to the actual/forecast number of approach and departure movements; and
- the INM requires touch and go training to be modelled as a circuit – the initial take-off coupled with the final landing – in conjunction with a number of touch and go operations – ie each INM "circuit" or touch and go corresponds to two aircraft movements.

24.3.2 Australian Noise Exposure Forecasts

The ANEF is a contour map showing forecast noise levels. It is based on the 2024/25 forecast level of aircraft movements detailed in Section 12. As such, it is important to appreciate that these are forecasts of noise in the future, not a reflection of the existing noise climate. For the purposes of noise modelling, forecast levels of aircraft movements are categorised into a range of different aircraft types (as different aircraft type categories have different noise profiles). The forecast number of movements by each aircraft type category are then modelled, taking into account the following factors:

- the runway strip end they are forecast to use;
- the flight tracks they are forecast to use; and
- the likely time of day of the operation.

> Aircraft Noise

ANEFs are primarily used for land use planning purposes.

24.3.3 N60 Modelling

In addition to ANEF contour based noise modelling, BAL has also undertaken modelling of noise metrics based on the number of aircraft noise events, based on recommendations from DoTaRS. N60 noise modelling measures the number of noise events over a specified period of time over particular flight paths. This allows the community to interpret aircraft noise issues based on actual counts of aircraft with a noise profile greater than 60 decibels over a range of flight paths.

24.4 Noise Analysis

The 2024/25 ANEF contour and N60 maps are provided in Figures 16 and 17.

The ANEF contours and N60 maps are provided on the aircraft type category, runway strip end use and day-night assumptions set out below. Flight track assumptions have been developed in consultation with Airservices Australia (Bankstown Air Traffic Control). In particular, helicopter flight tracks have been developed in consultation with Airservices Australia and reflect current practices as well as projected future tracking options associated with a relocation of the airport helipad to the southern side of the runway complex. These options optimise tracks over the Georges River and industrial areas rather than the residential areas of Milperra

24.4.1 Aircraft Type Categories

The distribution of aircraft movements into aircraft type categories has been done on a conservative basis – that is, for the purposes of noise modelling, more aircraft have been allocated to relatively noisier aircraft type categories than actually included in the traffic forecast. This has been done to ensure that the noise modelling outputs presented represent worst case scenarios. The distribution of forecast aircraft movements by aircraft type categories is presented in Table 9.

Noise modelling has not taken account of any potential benefits arising from emerging low noise aircraft technology.

Table 9
Distribution of Aircraft Movements into Aircraft Type Categories

Aircraft Type Category	Typical Aircraft in Category	% of Total Movements 24/25
Typical Regional Airline (interstate)	DHC-8	2.65%
	Saab 340	
	BAe 146	
Typical Regional Airline (intrastate)	DHC-6	2.34%
	Beech 1900	
	SA-226 Metro	
Business	Cessna 441	4.34%
	Beech 200	
	Cessna 500	
	IA 1125	
	Douglas DC3	
General Aviation	BECF 58*	31.32%
	GASEPV*	
	GASEPF*	
Training	BECF 58*	48.49%
	GASEPV*	
	GASEPF*	
Helicopter	HEL11A	5.70%
	Sikorsky S-76	
Helicopter Training	HEL11A	5.70%
Total		100

* The Australian Civilian Aircraft Register lists about 200 types of general aviation piston engine aircraft. For noise modelling purposes, this number has been reduced to three INM based aircraft profiles as follows: GASEPF = low performance single engine aircraft, GASEPV = high performance single engine aircraft; and BECF58P = conventional twin engine aircraft. For Helicopters, the HEL11A model represents the single engine helicopter types and the S76 represents the twin engine helicopter types.

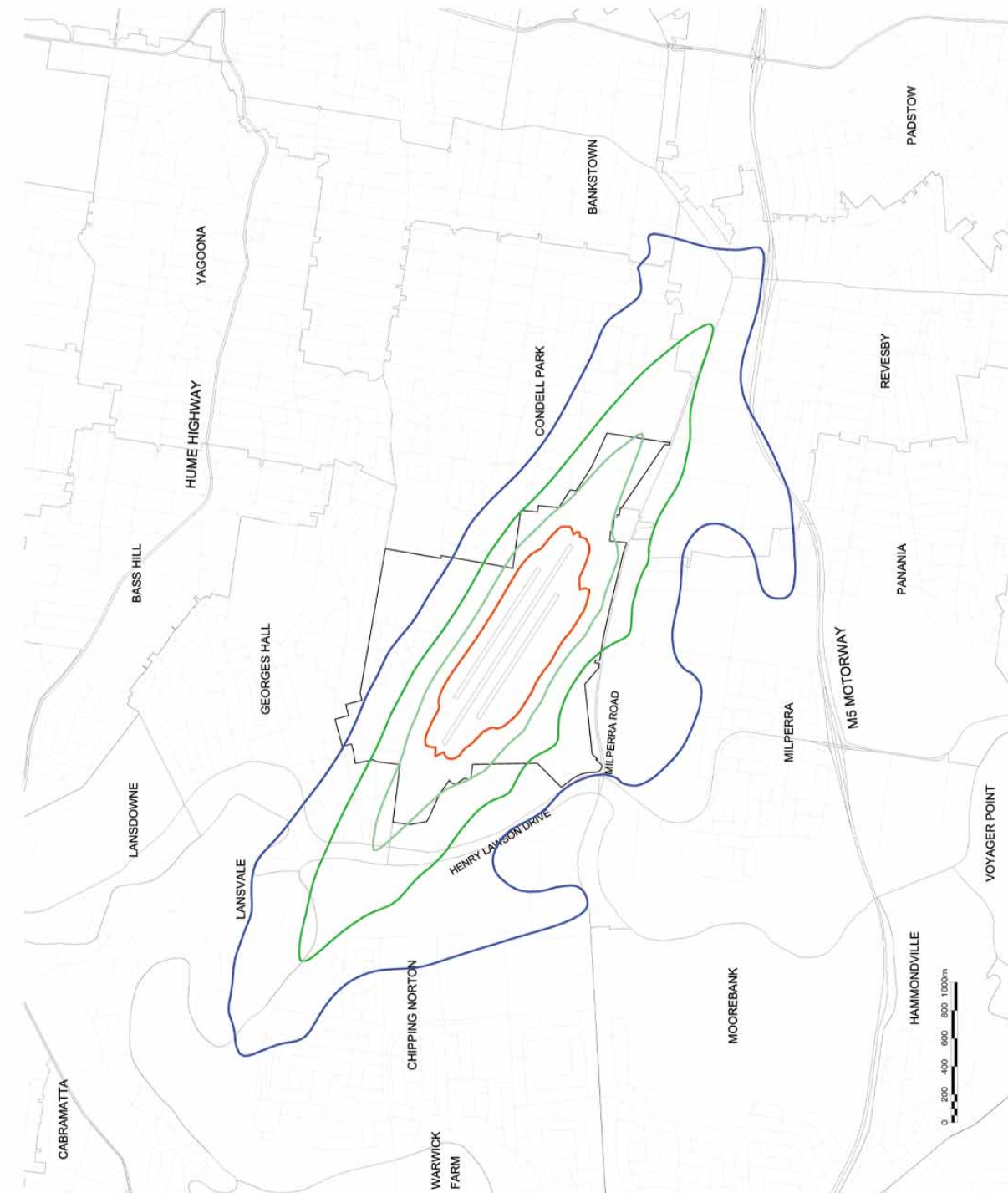
> Figure 16

2024/25 Australian Noise Exposure Forecast



LEGEND

- 20 ANEF
- 25 ANEF
- 30 ANEF
- 35 ANEF



> Figure 17

Bankstown Airport 2024/25 N60 Map

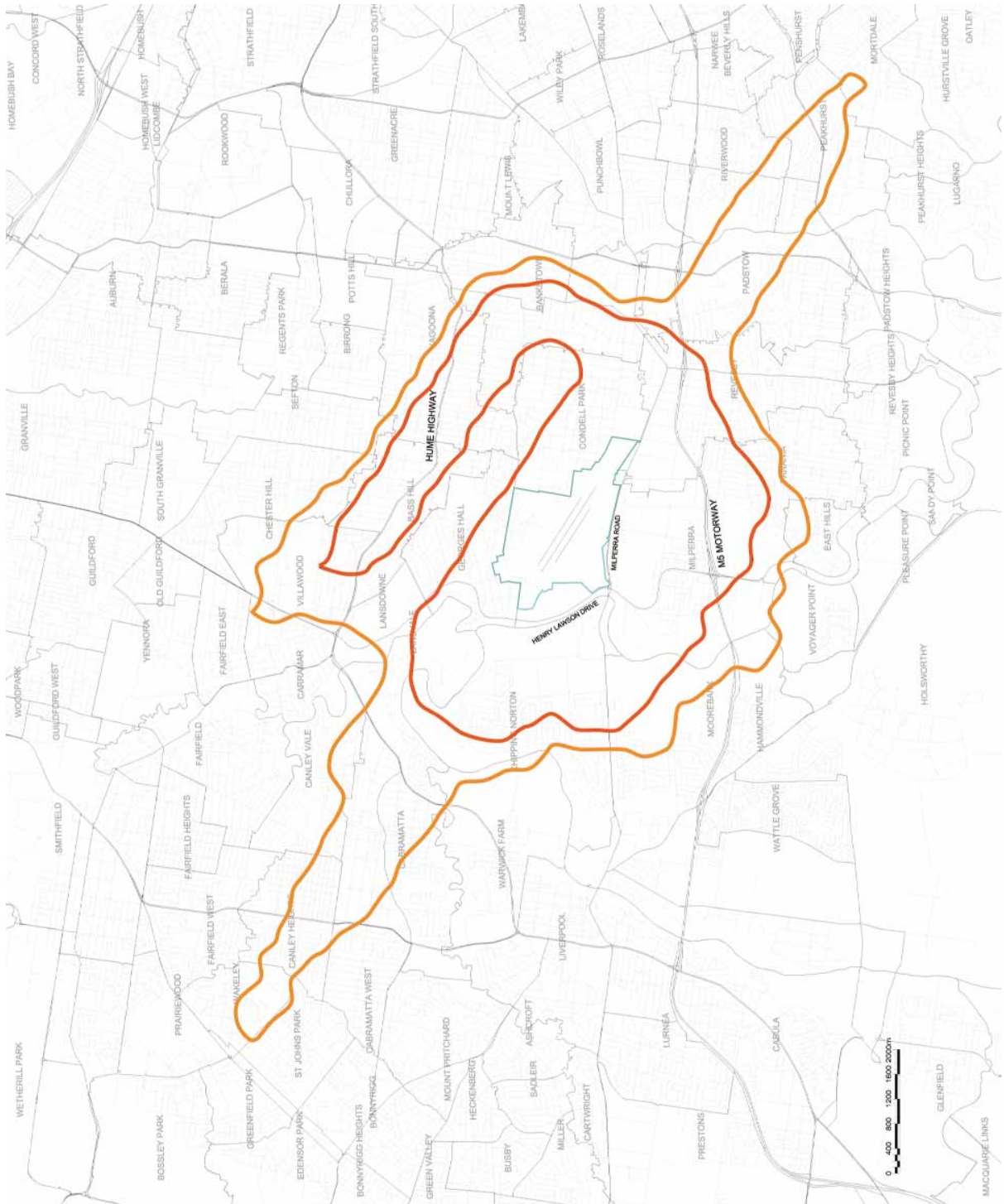


LEGEND

— 50 EVENTS

— 100 EVENTS

DAILY AVERAGE NUMBER OF NOISE
EVENTS OVER 60 DECIBELS



> Aircraft Noise

24.4.2 Runway End Use

For the purposes of noise modelling, the forecast level of traffic must be allocated according to runway end use. This determines which flight tracks will be used for noise modelling purposes. The allocation of traffic by runway end use is based on the following factors:

- analysis of current runway end data; and
- analysis of forecast traffic by activity and allocation to appropriate runway.

The distribution of forecast aircraft movements by runway end is presented in Table 10.

Table 10
Distribution of Forecast Aircraft Movements by Runway End

Runway	% of Movements 24/25
11C	13.6%
11L	8.4%
11R	22.1%
29C	14.5%
29L	22.1%
29R	8.4%
H11	5.4%
H29	5.4%
Total	100%

24.4.3 Day-Night

There are no official statistics kept on day versus night traffic splits at GA airports such as Bankstown. Nevertheless, BAL has derived estimates from the following sources:

- BAL's aviation charging system, which uses pilot radio call recordings to determine activity outside of Control Tower hours; and
- the tenant and user survey conducted for this MP as part of the consultation program.

The assumptions made are as follows:

- fixed wing aircraft: 90% day, 10% night; and
- rotary aircraft: 98% day, 2% night.

24.5 Noise Impact Management Measures

The noise modelling conducted for this MP takes into account a number of Airservices Australia's noise impact management measures already in place at Bankstown Airport. These measures are supported by BAL and include:

- restriction of circuit training operations (touch and go movements) to between 6am and 11pm, Monday to Friday, and to between 6am and last light on weekends;
- where possible, direction of fixed wing flying training (circuits) to Runway 11R/29L to the maximise the extent of circuits done over open space and commercial/industrial areas to the south of the Airport;
- flight paths that direct helicopter training primarily over industrial areas to the south of the Airport; and
- restriction of night circuits for aircraft operations to the southern side of the airport.

In consideration of aircraft noise factors, the Design Aircraft selected for this MP was based on the types of aircraft that can already utilise the aviation infrastructure at Bankstown Airport. The Aviation Development Concept categorically rules out Code 4C aircraft from utilising Bankstown Airport.

For the MP the helicopter flight paths have been amended based on Airservices Australia advice to reduce the impact of this activity over Milperra.

In addition, BAL will develop a noise management plan. This plan will include consideration of changes to the current operating procedures, such as the restriction of operation of noisy aircraft at night. BAL intends BACCF to have an ongoing consultative role in the development and introduction of the plan.

24.6 Significant ANEF Contours

The 2024 ANEF prepared as part of this MP include 20, 25, 30 and 35 ANEF contours. In terms of the significant ANEF contours, the 35 ANEF contour is contained wholly within the Airport's boundary, while the 30 ANEF contour only exceeds the Airport's boundary at the western and eastern extremities of the site. At the eastern end of the site, the 30 ANEF contour goes over an area zoned as General Industry, while at the western end the 30 ANEF contour crosses Rabaul Road and a small area of residential. While at current traffic levels, the 30 ANEF contours are contained wholly within the site, noise modeling suggests the 30 ANEF contour will creep over the Airport boundary when traffic reaches the levels forecast for 2010. BAL supports the Airservices Australia noise management measures which attempt to reduce the impact over this area and has initiated discussions with Airservices Australia and Bankstown City Council over appropriate measures to manage this impact.

BAL will ensure that on land within the airport site, the provision of Australian Standard 2021 will be compiled with for any new development on land above the significant contour. In relation to land outside the airport site, BAL has advised BBC of the land to be effected and has advised it of the requirements of Australian Standard 2021.

The proposed noise management plan will also address measures for managing this impact, including proposing changes to the Bankstown LEP and other proposals for Council consideration to prevent further development in these areas or to ensure that any further development will be constructed to meet Australian Standard 2021-1994.

24.7 Current v's Proposed ANEFs

The ANEF modelling undertaken as part of this MP is intended to replace the current ANEF contours endorsed by Airservices Australia, prepared in 1990.

A comparison between the current, endorsed ANEF and the proposed ANEF prepared for this MP is presented in Figure 18.

The comparison highlights the following changes:

- a substantial reduction in the 20 ANEF contour. This reduction reflects the following factors:
 - utilisation of more realistic traffic forecasts (including level of traffic and aircraft mix) in the 2024/25 ANEF than used in the endorsed ANEF conducted in 1990;
 - changes to the number of runways (from 6 to 4) and changes to their alignment; and
 - more sophisticated noise modelling techniques.
- A substantial reduction in all other ANEF contours.

Despite the reduction in ANEF contours between the current endorsed ANEF done in 1990 and the 2024/25 ANEF prepared for this MP, there will be increases in aircraft noise due to changes in the number and mix of aircraft forecast in this MP. The extent of these changes are shown in the 2024/25 ANEF and the 2024/25 N60 contours shown in this MP. The contour plans reflect forecast traffic changes as well as changes in runway configuration (ie. closure of runway 18/36 and extension of runway 11C/29C).

> Figure 18

Bankstown Airport Current Versus Proposed 2024/25 ANEF



LEGEND

- CURRENT ANEF
- PROPOSED 2024 ANEF

