

### ANEF STUDY CIRCUIT TRAFFIC

### **CESSNOCK AERODROME, NEW SOUTH WALES**

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#### ABBREVIATIONS

AEDT	Aviation Environmental Design Tool
ANEF	Australian Noise Exposure Forecast
AS	Australian Standard
CASA	Civil Aviation Safety Authority
CAT	Category
DA	Decision Altitude
DAP	Departures and Approach Procedures
DH	Decision Height
DME	Distance Measurement Equipment
ERSA	En Route Supplement Australia
GAS	Global Airspace Solutions
GNSS	Global Navigation Satellite System
ICAO	International Civil Aviation Organization
km	Kilometre
NM	Nautical Mile
NSW	New South Wales
OPS	Operations
RNAV	Area Navigation
RWY	Runway
THR	Threshold

#### **1** INTRODUCTION

#### 1.1 MOTIVATION

Cessnock City Council engaged Global Airspace Solutions to assess the aircraft noise produced by aircraft flying visual circuits at Cessnock Airport.

Global Airspace Solutions has been requested to develop noise contours charts providing an overview of the ANEF contours and additional the LAmax contours, which provide aircraft noise levels.

The LAmax contours have been added to comply with Australian Standard 2021:2015, Appendix E which describes the "Method for determining building site acceptability for light general aviation aerodromes without ANEF charts"

#### 1.2 PURPOSE, TARGET AUDIENCE, STATUS

The purpose of this document is to provide an overview of the noise contours for Cessnock Airport, which can be used for land development planning.

#### 1.3 CRITERIA

 Australian Standard 2021:2015 – Acoustics – Aircraft noise intrusion – Building site and construction, 25 March 2015;

#### 1.4 DOCUMENTS

- ICAO Doc 9911 "Recommended Method for Computing Noise Contours Around Airports", 2<sup>nd</sup> Edition, 2018
- AEDT Version 3d, "Technical Manual", March 2021
- AEDT Version 3d, "User Manual", March 2021

#### 1.5 REFERENCE DATA

- Overview of Aircraft Movements provided by the Cessnock City Council.
- Overview of the Cessnock Airport Circuits location for runway 17 and 35.
- En Route Supplement Australia (ERSA), 17 JUN 2021.

#### 1.6 SOFTWARE TOOLS

• Aviation Environmental Design Tool (AEDT) 3d, Version 153.0.13097.1, March 2021;

#### 2 INFORMATION

#### 2.1 GENERAL

#### 2.1.1 Aerodrome

Cessnock Aerodrome is a certified aerodrome operated by the Cessnock City Council. The aerodrome is suitable for maximum CAT C aircraft.

#### 2.1.1.1 Environment

Cessnock Aerodrome is located 6 km north of the City of Cessnock and 3.7 km east of Pokolbin. The aerodrome is generally surrounded by rural properties operated as vineyards, small scale agricultural operations and rural residences.

There are plans to develop a housing estate southwest of the airport.

Cessnock aerodrome houses number of flight training schools and other flying services, including private aircraft hire, charter, scenic flights and a parachute jump operator.

#### 2.1.1.2 ERSA Information

The En Route Supplement Australia (ERSA) details the following local traffic regulations and flight procedures:

- Circuit training restricted between 8am and 10pm.
- Right hand circuits required for runway 35 between sunset and sunrise.
- Left hand circuits during daylight hours
- Circuit OPS to be conducted within 2NM radius due to terrain and noise abatement
- Visual straight-in approach not permitted
- Pilots should maintain the extended runway centre line after take-off until the aircraft is at least 500 ft above terrain
- Due to terrain to the south and west and the proximity of adjacent flying training areas, pilots should depart the circuit areas by extending the upwind, crosswind or downwind leg.

#### 2.1.1.3 Tracks

Cessnock City Council has provided an overview of the circuit dimensions for RWY 17 and RWY 35. Cessnock is in the process of acquiring a RNAV(GNSS) RWY 35 approach, which is at the time of writing this report still in development. The approach track was known by GAS.

The departures follow the circuit directions and therefore are part of the total circuit movements as published in Appendix 3.

#### 2.1.2 Overview Aircraft Types

Cessnock Airport houses a variety of aircraft during the year, including historical aircraft and helicopters during the fire season. Cessnock City Council has provided an overview of the numbers, type of aircraft and estimated movements per year, See Appendix 3.

#### 2.2 AUSTRALIAN NOISE EXPOSURE FORECAST (ANEF)

ANEF<sup>1</sup> is a single number index for predicting the cumulative exposure to aircraft noise in communities near aerodromes during a specified time period (normally one year).

The computation of this index includes:

<sup>&</sup>lt;sup>1</sup> Australian Standard 2021:2015, Paragraph 1.5.6

- Measurements of aircraft noise (expressed in Effective Perceived Noise Decibels, EPNdB), which take account of the spectral, temporal and spatial aspects of the noise.
- Estimates and generalizations of aircraft type groups and mix, number of operations, runway utilization, flight paths and operational procedures; and
- Time of day, i.e. whether daytime (7am 7pm) or evening/night-time (7pm 7am).

This single number index is useful for rating the compatibility of various land uses with respect to aircraft noise. For this purpose, equivalent ANEF values at individual positions around an aerodrome are combined on a map to form ANEF contours.

Table 2.1 of the Australian Standard 2021:2015 identifies the building site acceptability for various building types for an ANEF zone. The table has been reproduced below (See Table 2-1).

	ANEF zone of site						
Building Type	Acceptable	Conditionally Acceptable	Unacceptable				
House, home unit, flat, caravan park	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF				
Hotel, Motel, Hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF				
School, university	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF				
Hospital, nursing home	Less than 20 ANEF (Note 1)	20 to 25 ANEF	Greater than 25 ANEF				
Public building	Less than 20 ANEF (Note 1)	20 to 30 ANEF	Greater than 30 ANEF				
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF				
Other industrial	Acceptable in all ANEF zones						

Table 2-1 Reproduction of AS 2021:2015 Table 2.1 "Building Site Acceptability Based on ANEF Zones"

NOTES:

- 1 The actual location of the 20 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 or near the 20 ANEF contour.
- 2 Within 20 ANEF 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.
- 3 There will be cases where a building of particular type will contain spaces used for activities which would generally be found in a different type of building (e.g. and office in an industrial building). In these cases AS 2021:2015 Table 2.1 should be used to determine site acceptability, but internal design noise levels within the specific spaces should be determined by AS 2021:2015 Table 3.3.
- 4 This 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 Aircraft Noise Reduction determined according to AS 2021:2015 Clause 3.2. For residences, schools, etc., the effect of aircraft noise on outdoor areas associated with the buildings should be considered.
- 5 In no case should new development take place in greenfield sites deemed unacceptable because such development may impact airport operations.

#### 2.2.1 AS2021:2015 Appendix E

Clause 2.1.2 in the Australian Standard 2021:2015 states that for aerodromes where the usage is confined to a small number of civil, non-jet aircraft movements the production of an ANEF chart may not be justified and is unlikely to occur. In these cases refer to Appendix E of the Australian Standard 2021:2015.

#### 2.2.1.1 General

Note: Where aerodrome usage is confined to a small number of civil, non-jet aircraft movements the production of an ANEF chart may not be justified and is unlikely to occur. In these cases this Appendix should be referenced.

The acceptability of a building site for a particular building type depends on both the maximum aircraft noise level and the average number of flights per day over the site.

#### 2.2.1.2 Procedure

Determine the aircraft noise levels to which the building site will be exposed. Compare the aircraft noise levels with the levels shown in the table below for the particular building type under consideration, and for the appropriate number of aircraft operations over the site.

Number of	Aircraft noise level expected at building site dB(A)							
flights per day	Acceptable	Unacceptable						
House, home unit, flat, caravan park, school, university, hospital, nursing home								
>30	<70	70-75	>75					
15-30	<80	80-85	>85					
<15	<90	90-95	>95					
Hotel, motel, hos	tel, public building							
>30	<75	75-80	>80					
15-30	<85	85-90	>90					
<15	<95	95-100	>100					
Commercial build	ling							
>30	<80	80-85	>85					
15-30	<90	90-95	>95					
<15	<100	100-105	>105					

Table 2-2 Reproduction of AS 2021:2015 Table E1"Building Site Acceptability Based on Aircraft Noise Levels"

The values in the above table are based on a small aerodrome with a small number of civil, non-jet aircraft movements. They should not be used in any other circumstances.

Note: The forecast daily average number of aircraft flights affecting the site should be obtained from the aerodrome owner. However, each night-time flight between 7pm and 7am is to count as four operations.

#### 2.2.1.3 Action resulting from acceptability determination

• **Acceptable:** If from Table 2-2 the building site is classified as "acceptable", there is usually no need for the building construction to provide protection specifically against aircraft noise.

- **Conditionally acceptable:** If from Table 2-2 the building site is classified as "conditionally acceptable", the required noise reduction should be determined in accordance with AS 2021:2015 Clause 3.2, and the aircraft noise attenuation to be expected from the proposed construction should be determined in accordance with AS 2021:2015 Clause 3.3.
- **Unacceptable:** If, from Table 2-2 the building site is classified as "unacceptable", construction of the proposed building should not normally be considered (see Notes 4 and 5 to Table 2-1, which is a reproduction of AS 2021:2015 Table 2.1).

#### 2.2.1.4 Noise Metric - LAmax

The LAmax is the maximum noise level from a single noise event which may be modelled or measured. LAmax results are reported in dBA, rounded to the nearest whole decibel. LAmax is also reported graphically representing the geographical area within which the maximum noise of a single over flight event is likely to be at or above these threshold levels.

The change in LAmax noise levels with reference to how people may perceive the sound is outlined below, noting that each individual may experience sound and perceive changes in noise levels differently:

- LAmax noise level changes of up to 3 dBA are not likely to be perceptible.
- LAmax noise level changes of between 3 dBA and 5 dBA may be perceptible.
- LAmax noise level increases of between 5 dBA and 10 dBA are likely to be perceptible.
- LAmax noise levels of greater than 10 dBA may be perceived as twice as loud.

LAmax noise contour modelling is used to provide the aircraft noise levels to which the building site will be exposed to.

The provide for a representative LAmax noise contour model the helicopters and L39 Jet have been excluded. For the graphical presentation see Appendix 2.

#### **APPENDIX 1: ANEF CONTOURS**

#### **RWY 17 – Traffic Circuit**



#### RWY 35 – Traffic Circuit and RNAV(GNSS) Approach



#### Both Runways – Traffic Circuit RWY 17 & 35 and RNAV(GNSS) Approach RWY 35



#### APPENDIX 2: LAMAX CONTOUR CHARTS (AS 2021:2015 APPENDIX E)

#### **RWY 17 – Circuit Traffic**



#### RWY 35 – Circuit Traffic and RNAV(GNSS) Approach



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#### APPENDIX 3: OVERVIEW DATA USED FOR ANEF CONTOURS MODELLING

				Airframe (AEDT-3d)	Model (AEDT-3d)	TRACKS USED			Estimated	Daily		
Aircraft type	Number on AD	ICAO	Used in AEDT-3d			Circuit RWY 35	Circuit RWY 17	RNAV(GNSS) RWY 35	Movements (per year)	Movements (300 days per year)	Operation count (07:00 - 19:00)	Operation count (19:00 - 07:00)
BK117	3*	BK117	No	-					200	0.7	-	-
EC120B2	2	EC120	No	-					300	1	-	-
Grumman Avenger	1	TBM / TBF	No	-					100	0.4	-	-
Hawker Hurricane	1	MKxx	No	-					50	0.2	-	-
Kittyhawk	1	P40E	No	-					50	0.2	-	-
North American Harvard T28	2	T-28	No	-					100	0.4	-	-
P51 Mustang	1	P51	No	-					50	0.2	-	-
RAA Aus various	50		No	-					7250	24.2	-	-
Skycrane	2*	S64	No	-					50	0.2	-	-
T28 Trojan	2	T-28	No	-					100	0.4	-	-
UH1 Firebird	4*	UH-1	No	-					200	0.7	-	-
Wirraway	1	CAC	No	-					30	0.1	-	-
Wolf Pitts	4		No	-					200	0.7	-	-
Yak 52	3	YAK-52	No	-					300	1	-	-
Cessna 150	3	C150	Yes	Cessna 150 Series	O-200	Yes	Yes	No	2500	8.4	7	1.4
Cessna 172	10	C172	Yes	Cessna 172 Skyhawk	IO-360-B	Yes	Yes	No	15000	50	40	10
Cessna 182	5	C182	Yes	Cessna 182	IO-360-B	Yes	Yes	No	2500	8.4	6	2.4
Cessna 208 - Caravan	1	C208	Yes	Cessna 208 Caravan	PT6A-114	Yes	Yes	Yes	50	0.2	0.1	0.1
Cessna 210 - Centurion	1	C210	Yes	Cessna 210 Centurion	TIO-540-J2B2	Yes	Yes	Yes	50	0.2	0	0.1
Cessna Baron	2	BE55	Yes	Beech E-55 (FAS)	TIO-540-J2B2	Yes	Yes	Yes	500	1.7	1.5	0.2
Cessna Titan 404	4	C404	Yes	Cessna 404 Titan II	TIO-540-J2B2	Yes	Yes	Yes	500	1.7	1.5	0.2
Cirrus Various	4	SR22	Yes	Cirrus SR22	TIO-540-J2B2	Yes	Yes	Yes	500	1.7	1.5	0.2
Diamond DA40		DA40	Yes	Diamond DA40	IO-360-B	Yes	Yes	No	1500	5	4	1
EC130	1*	EC130	Yes	Eurocopter EC-130	TPE331-3	Yes	Yes	No	400	1.4	1.2	0.2

#### ANEF STUDY CIRCUIT TRAFFIC

Noise Assessment Report

#### Version: **1.0** – Status: **Releasable** Classification: **Commercial-in-Confidence**

Aircraft type				Airframe (AEDT-3d)		TRACKS USED			Estimated	Daily		
	Number on AD	ICAO	ICAO Used in AEDT-3d		Model (AEDT-3d)	Circuit RWY 35	Circuit RWY 17	RNAV(GNSS) RWY 35	Movements (per year)	Movements (300 days per year)	Operation count (07:00 - 19:00)	Operation count (19:00 - 07:00)
Embraer Phenom 300	1	E55P / EMB-505	Yes	Embraer 505	PW530	Yes	Yes	Yes	100	0.4	0.2	0.2
L-39 Albatros	1	L39	Yes	T-38 Talon	J85-GE-5H (2/AB)	Yes	Yes	No	300	1	1	0
Mooney M20j	1	M20J	Yes	Mooney M20-K	TSIO-360C	Yes	Yes	No	100	0.4	0.3	0.1
Piper Archer III	10	P28	Yes	Piper PA-28 Cherokee Series	IO-360-B	Yes	Yes	No	15000	50	40	10
Piper Comanche	2	PA24	Yes	Piper PA-24 Comanche	TIO-540-J2B2	Yes	Yes	No	100	0.4	0.3	0.1
Pitts special	4	S1	Yes	Pitts Special S-1 (FAS)	TIO-540-J2B2	Yes	Yes	No	200	0.7	0.7	0
Robinson R22	1	R22	Yes	Robinson R22	IO-320-D1AD	Yes	Yes	No	500	1.7	1.5	0.2
Robinson R44	4	R44 - Raven II R44 - Clipper II	Yes	Robinson R44 Raven / Lycoming O-540-F1B5	TIO-540-J2B2	Yes	Yes	No	2500	8.4	7	1.4

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