FARNBOROUGH
AIRPORT

Sections 106 and 299A
Town and Country Planning Act 1990

Interim INM7 Noise Assessment 2021
Predictive Contours July to December 2021

CONTENTS

FIGURES

APPENDIX

INTRODUCTION

1.1 In compliance with the requirements of paragraph 2.5 a), c), d) and e) of the Section 106/299A Town and Country Planning Act 1990 agreement, between Rushmoor Borough Council (RBC) and TAG Farnborough Airport (TFA), this report provides details of the outcome of the latest Integrated Noise Model Study run for business aviation operations at Farnborough.

This report is for the first half of 2021 and includes predictive contours for the second half of 2021 based on current forecasting. The INM modelling process employed in preparation of this report has not been subjected to a validation process. In compliance with paragraph 2.5e validation on the model is only carried out on the annual assessment.

1.2 Paragraph 2.5 of the planning agreement states:

a) At the end of the 2nd quarter in each successive year the INM model will be used to produce noise contours based on the preceding 6 months' actual movements and a second set of theoretical contours for the next 6 months

c) These sets of contours shall be supplied to the council no later than 6 weeks after the model has been used.

d) For paragraphs 2.5 a) and c) the INM model shall use a simplified departure track representation and such simplified departure track representations shall be made after inspection of the spread of actual aircraft tracks on site.

e) For paragraphs 2.5 a) and c) the INM model shall include terrain information and at the end of each year the results shall be compared between the individual INM predicted levels with the measured levels determined by the fixed and mobile monitoring points in and around the site.

This report is intended to address the requirements of paragraph 2.5, a), c), d) and e).

1.3 The use of the INM model, to produce noise contours relating to business aircraft movements at Farnborough, assess the noise impact on the surrounding area under existing conditions and the potential impact of the predicted growth of the airport as permitted by the Planning Agreement.

1.4 Civil operations at Farnborough are restricted to 'daytime' hours only (as defined by PPG 24 "Planning and Noise"). The airport is open from 07:00 to 22:00 hrs on weekdays and 08:00 to 20:00 hrs at weekends. The modelling process uses representative tracks produced from inspection of real track data, to construct contours that represent the time-averaged noise of operations.

1.5 In compliance with clause 2.7 of the Planning Agreement, Bickerdike Allen Partners were selected to undertake the last audit of the INM methodology in January 2021. The next audit will be undertaken in January 2022.

1.6 For this report modelling was completed for the period January to June 2021, using version 7.0d of the FAA's Integrated Noise Model (INM).

1.7 As in previous reports, the contours displayed within this report are referenced against the work commissioned by RBC from Acoustic Technology Ltd during the consideration of the original Airport planning application. The outcome of this work established contours that are referred to in paragraph 2.1a of the Agreement, annotated as the "control contours" within this document.

1.8 In accordance with clause 12.1 of the planning agreement, a further reduction in area of the control contours has been applied. The reductions are as follows:

- a 72.5% reduction of the land area within the 55dB(A) $L_{Aeq,16h}$ contour
- a 60.0% reduction of the land area within the 60dB(A) $L_{Aeq,16h}$ contour

The resultant effect on the land area within the control contours is displayed in Table 1.

1.9 The period of operation on which this report is based is the period January to June 2020. Aircraft operations during this period consisted of 8,198 movements of the categories required to be included under the Planning Agreement. This figure is substantially less than previous years, this being a direct result of the COVID-19 pandemic.

2 METHODOLOGY

2.1 In accordance with advice from independent acoustic consultants and with the agreement of RBC, INM 7.0d has been used for the noise contour modelling procedure. This is the most recent version of the software and allows helicopter movements to be integrated into the modelling process together with consideration of surrounding terrain.

2.2 The core stages of the contour methodology are as follows:

- Preparation of an INM study using relevant data from the latest edition of the UK Aeronautical Information Package, including the dimensions and positioning of the runway.
- Creation of user defined arrival profiles to reflect the steeper 3.5 degree approach in operation at Farnborough.
- Production of simplified departure and arrival track representations following inspection of actual track data from the Brüel and Kjær Track Monitoring System. Representations include designation of Noise Abatement Procedure tracks and procedure cancellation tracks. Dispersion is applied to these tracks to reflect the variations in routes flown and observed in the actual track data.
- Determination of the split of traffic in terms of runway and operation (06 / 24 and departure / arrival) and the split of departure operations on each of the identified routes. This is achieved from analysis of the Air Traffic Control Movement Logs.
- Summarising the actual movement by aircraft type and then the application of representative INM aircraft types using a substitutions list for those types where noise data is not included within the model.
- Running of the contour model from an INM input using actual data to provide movement numbers for the modelled flight tracks.

Preparation of input files

2.3 Flight data used in this study was taken from radar tracks processed by Farnborough's Brüel and Kjær Noise and Track Monitoring System (NTMS). The raw data has been inspected and used to produce representative tracks which are in turn used by the model in the prediction of the noise contours.

2.4 INM is primarily designed to deal with commercial air traffic rather than the specialist business aircraft types operating at Farnborough. Aircraft types in operation at Farnborough, if not available within the standard model profiles, are represented by the closest available substitutes on the INM Substitutions List. Where aircraft are not adequately represented by aircraft on the INM substitutions list, appropriate substitutions are made by reference to engine types. All substitutions used are detailed in Appendix 1.

Predicted Contours

2.5 The predicted contours for the period July to December 2021 have been generated using movement data from the preceding six months (representative tracks and aircraft type mix). The predicted number of movements for this period is 15,150 and is based on current forecasts.

3 RESULTS

3.1 The INM 7.0d contours produced for this reporting period are shown together with the RBC 1997 Planning Contours in Figure 1. Predicted contours using the Jan to Jun 2020 fleet and movement mix, are shown in Figure 2. Both contours allow for helicopter movements which are assumed to show the same increase in numbers from the first to the second half of the year. When examining the contours there are several important points to note:

- The planning agreement refers only to 55 and 60dB(A) $L_{Aeq,16h}$ however a third 65dB(A) $L_{Aeq,16h}$ contour has been added for information
- The contour areas for this reporting period are within the planning permission control contour areas, as amended through clause 12.1 of the planning agreement
- The predicted contour areas for this reporting period are within the planning permission control contour areas, as amended through clause 12.1 of the planning agreement
- The contours are based on the assumptions and data inputs as described within this report.
- The contours should be regarded as indicative only and represent time averaged noise levels expressed as dB(A) $L_{Aeq,16h}$. This measure represents the sound energy released as noise varies over time, expressed as an average for the relative time period
- Control Contours included as part of the planning agreement between RBC were theoretical in that they used conceptual aircraft tracks. The contours attached to this document are generated using representative tracks created through inspection of actual radar flight track data
- Helicopter movements are included in the modelling process of this report, following the use of INM7.0d and advice from independent noise specialists
- The steeper than standard angle of approach used at Farnborough (3.5 as opposed to 3 degrees) has been allowed for; increasing the modelled height of arriving aircraft

- The INM modelling process for this report has not been subjected to validation against measured noise levels at the Airport's Noise Monitoring Terminals (NMTs). As demonstrated by the exercise reported at the Public Inquiry in 2010, some of the INM standard aircraft substitutions used older aircraft types which typically overestimate the noise levels of the more modern types operating at Farnborough.

Comparison of total land area within each Noise Contour

3.2 Tables 1 and 2 compare the total land area within each contour for both the "control contours" and the most recently produced actual and predicted contours.

Table 1: Predicted noise contour areas, 20,000 movements at 1997 mix (Control Contours)

dB(A) $L_{Aeq,16h}$	**Predicted 20,000 movements** 1997 mix (km^2)	**Amended Control Contour Areas** as per clause 12.1 of the S106 (29/10/2010) (km^2)
55	9.07	6.58
60	4.03	2.42
65	1.70	n/a

Table 2: Contour areas: Actual Jan – Jun 2021 and Predicted Jul - Dec 2021

dB(A) $L_{Aeq,16h}$	**Actual contour areas Jan to Jun 2020** 8,198 actual movements (km^2)	**Predicted contour areas, Jul to Dec 20** 15150 predicted movements, Jan – Jun 21 fleet mix (km^2)
55	1.28	2.04
60	0.61	0.90
65	0.27	0.42

4. CONCLUSION

4.1 Contours and predicted contours for this reporting period are within the planning permission area limit. Their size is considerably smaller than the original planning consent contours, reflecting the change in aircraft operations on which the modelling process is based, and the allowance for the steeper approaches used.

Miles H Thomas
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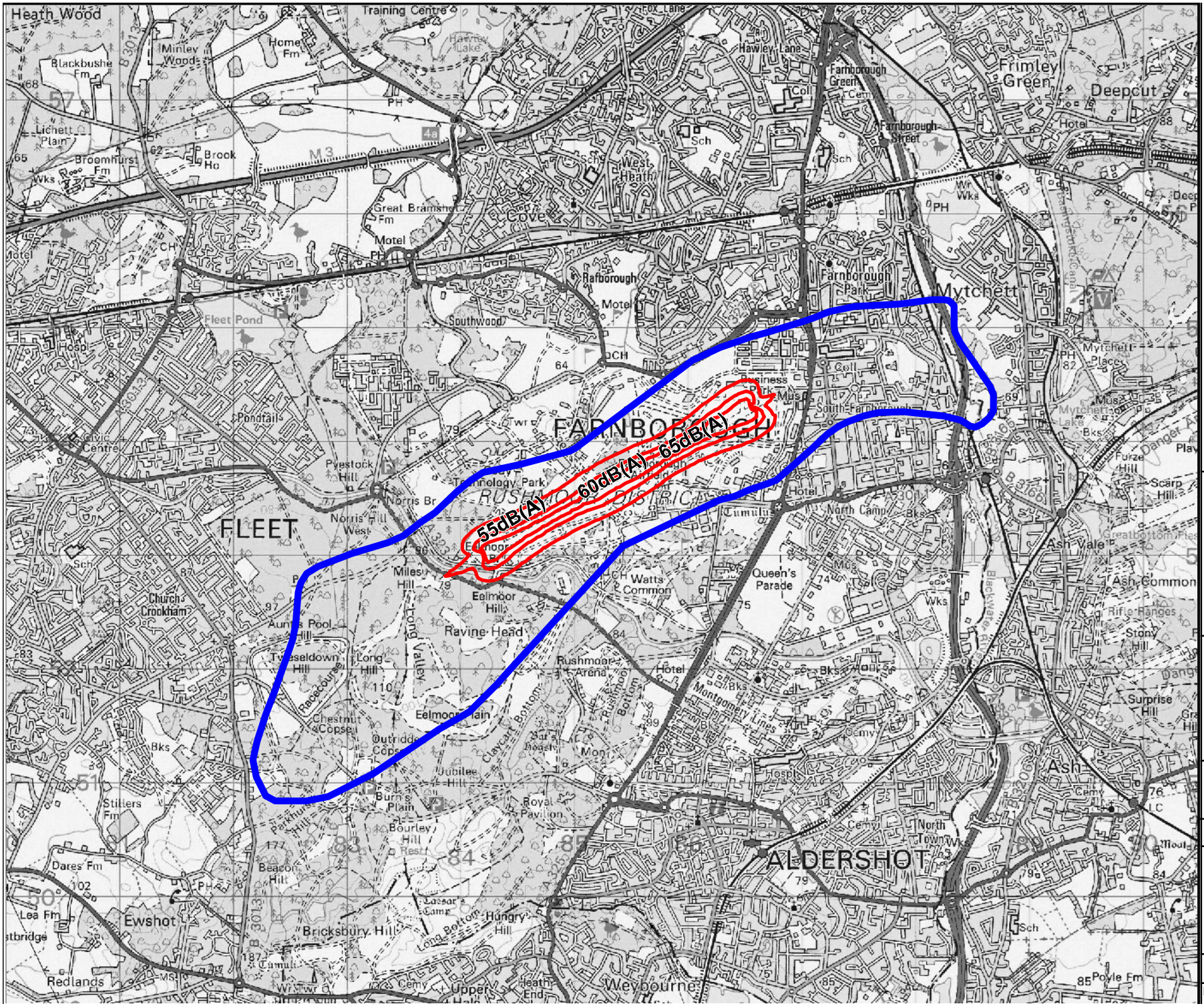
11/08/2021



Key:

- Airport Noise Contours dB(A) LAeq 16
- Planning limit 55dB(A) LAeq 16 Noise Contour

Revisions

Farnborough Airport Ltd
Farnborough
Hampshire
GU14 6XA

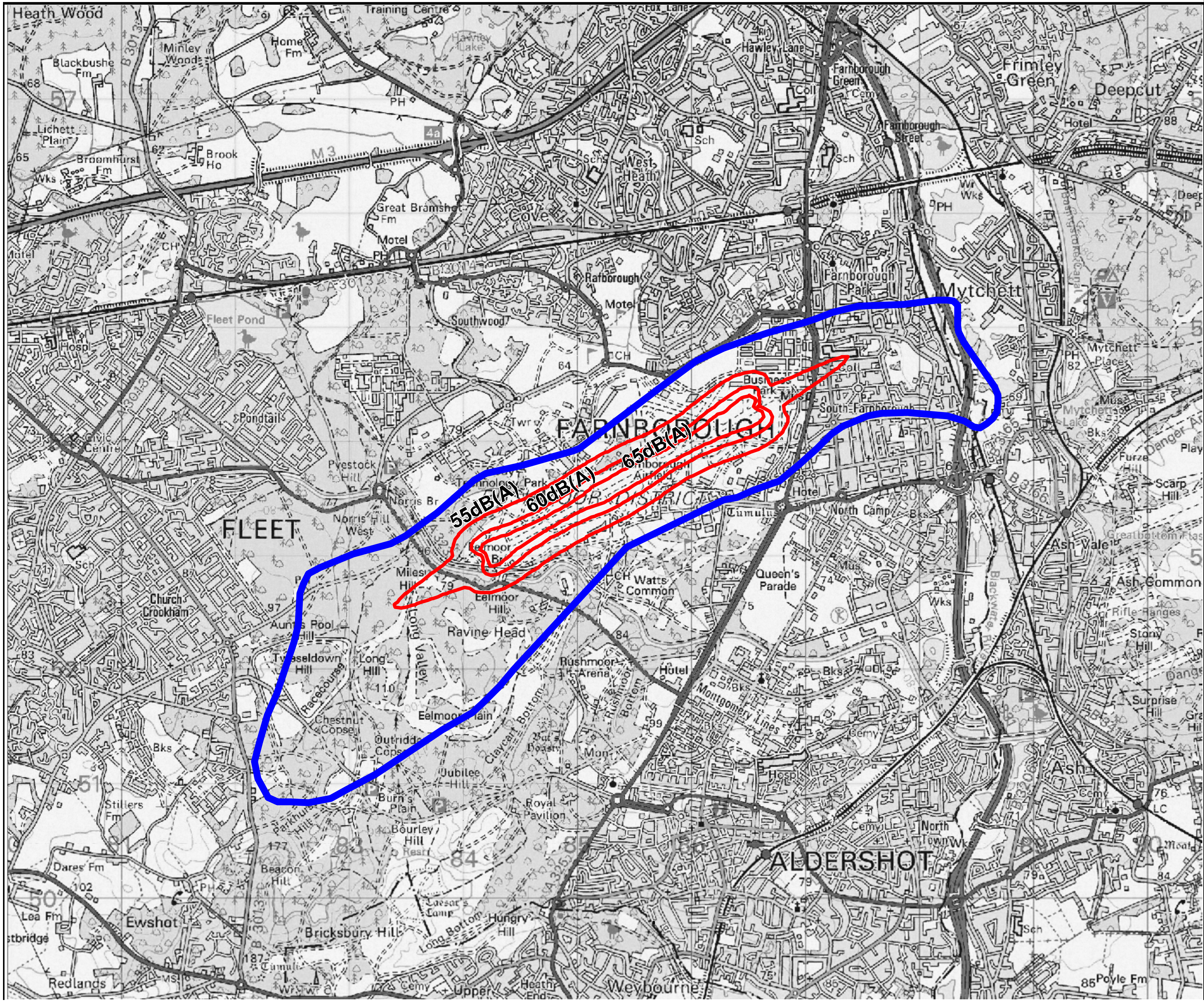
Scale@A4	Date	Drawn by
1:40 000	06/08/20	DB

Title

Figure 1:
Airport Noise Contours
1st Half 2021

Drawing No.	Rev No.
GN TG A OP 3179	A

File



Key:

Airport Noise Contours dB(A) LAeq 16

Planning limit 55dB(A) LAeq 16 Noise Contour

Revisions

TAG Farnborough Airport Ltd
Farnborough
Hampshire
GU14 6XA

Scale@A4	Date	Drawn by
1:40 000	12/08/2021	DB

Title

Figure 2:
Airport Noise Contours
2nd Half 2021 Predictive

Drawing No.	Rev No.
GN TG A OP 3083	A

File

Appendix 1

INM 7.0d Substitution List

Key:

Aircraft Operational Code:	Operational ATC aircraft type identification
Substituted INM Aircraft code:	Equivalent aircraft code as used by INM programme

N.B. Operational Codes do not necessarily reflect correct ICAO Codes The standard aircraft INM departure profile was used for all aircraft entered. For arrivals profiles are created to reflect the steeper approaches undertaken at Farnborough Airport.

Operational Aircraft Code	INM Aircraft Code / Substitution Code
A19N	A320-232
A20N	A320-232
A318	A319-131
A319	A319-131
A320	A320-232
ASTR	IA1125
B190	CNA441
B350	CNA441
B462 / 3	BAE146
B733	737300
B734	737400
B735	737500
B737	737700
B738	737800
B739	737800
BE20	CNA441
BE30	DO228
BE40	MU3001
BE9L	CNA441
BN2T	BEC58P
C152	CNA172
C172	CNA172
C25A	CNA525C/CNA55B
C25B	CNA525C
C25M	CNA500
C425	CNA441
C501	CNA500
C510	CNA510 / CNA560XL
C525	CNA525C
C550	CNA500
C551	CNA500
C560	MU3001
C56X	CNA560XL
C650	CIT3
C680	CNA680
C68A	CNA680 / CNA750
C700	CNA750
C750	CNA750
CL30	CL601
CL35	CL601 / CNA560XL
CL60	CL600 / CNA560XL
CRJ2	CL601 / CNA560XL
CRJ7	CRJ9-ER
CRJ9	CRJ9-LR
CRJX	CRJ9-ER
D228	DO228
D328	DO328
DA42	BEC58P
DA62	BEC58P
DHC1	GASEPF
E135	EMB145
E145	EMB145
E170	EMB170
E190	EMB190
E295	EMB190
E35L	EMB145 / F10062
E500	CNA20T
E50P	CNA510
E545	EMB145
E55P	CNA510 / CNA560XL
EA50	ECLIPSE500
F100	F10065
F2TH	CL600 / F10065
F406	CNA441
F900	F10062
FA10	LEAR35
FA50	F10062
FA7X	F10062 / F10065
FA8X	F10062
G150	IA1125
G200	CNA750
G280	CL601
GA5C	GV
GA6C	GV
GA7	BEC58P
GALX	CNA750
GL5T	GV / F10065
GL7T	GV
GLEX	GV / F10065
GLF4	GIV
GLF5	GV / F10065
GLF6	GV / F10065
H25A	LEAR35
H25B	LEAR35 / CNA55B
H25C	LEAR35
HA4T	CL600
HDJT	CNA510
JS41	SF340
LJ31	LEAR35
LJ35	LEAR35
LJ40	LEAR35
LJ45	LEAR35
LJ55	LEAR35
LJ60	CNA55B
LJ75	CNA560XL
P180	SD330
P46T	GASEPV
PA31	PA31
PA32	GASEPV
PC12	CNA208
PC24	CNA525C
PRM1	LEAR35
RJ1H	BAE300
SB20	HS748A
SF34	SF340
SF50	ECLIPSE500
TBM7	CNA208
TBM8	CNA208
TBM9	CNA208

Helicopters

A109	A109
A119	A109
A139	SA330J
A169	S76
A189	S61
AS355	SA355F
AS365	SA365N
B06	B206L
B429	B429
EC20	SA341G
EC35	EC130
EC45	B429
EC55	SA365N
EH10	S65
EXPL	B407
H500	H500D
MD60	B407
R66	R44
S76	S76
S92	S70