



TAG Farnborough Airport
Sections 106 and 299A

Town and Country Planning Act 1990
Annual INM7 Noise Assessment 2012
Predictive Contours January to December 2013

CONTENTS

1. Introduction
2. Methodology
3. Results
4. Conclusions

FIGURES

1. Airport Noise Contours, January to December 2012 against the 1997 Planning Application Contours
2. Airport Noise Contour Predictions, January to December 2013 against the 1997 Planning Application Contours

APPENDIX

1. INM 7.0c Substitution List

INTRODUCTION

- 1.1 In compliance with the requirements of paragraph 2.5 b), c), d) and e) of the Section 106/299A Town and Country Planning Act 1990 agreement, between Rushmoor Borough Council and TAG Farnborough Airport, 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 calendar year 2012 and includes predictive contours for 2013 based on forecast growth in movement numbers and aircraft track data from the study year.

- 1.2 Paragraph 2.5 of the planning agreement states:

- b) *At the end of the 4th Quarter in each year the INM model will be used to produce noise contours based on the actual movements in the past year and a second set of theoretical contours for the year ahead*
- 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, b), c), d) and e).

- 1.3 The intended use of the INM model, to produce noise contours relating to business aircraft movements at Farnborough, is to 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 Following the use of INM 7.0c in the Annual Noise Assessment 2012, an audit of the methodology was undertaken in January 2013. Bickerdike Allen Partners were selected to undertake the audit, the results of which are published in the Annual TAG Performance Monitoring Report 2012 in compliance with clause 2.7 of the Planning Agreement. The next audit will be undertaken in January 2014.
- 1.6 For this report modelling was completed for the period January to December 2012 using Version 7.0c of the FAA's Integrated Noise Model (INM). This latest version of INM includes new aircraft types that better represent those in operation at Farnborough Airport together with a number of new and revised aircraft substitutions.
- 1.7 As in previous reports, the contours displayed within this report are referenced to the work commissioned by Rushmoor Borough Council from Acoustic Technology Ltd during the consideration of the original TAG 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, further reductions in area of the control contours are applied prior to comparison to those produced for this reporting period. 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 January to December 2012. Aircraft operations during this period consisted of 23,017 movements of movement types required by the Planning Agreement.

2 METHODOLOGY

2.1 In accordance with advice from independent acoustic consultants and with the agreement of Rushmoor Borough Council, INM 7.0c has been used for the noise contour modelling procedure. This is the most recent version includes helicopter movements and allows for 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 (TMS). Representations include designation of Noise Abatement Procedure tracks and procedure cancellation tracks. Application of dispersion to reflect the variations in track observed from the TMS 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, through analysis of the Air Traffic Control Movement Logs.
- Summarising the actual movements by aircraft type and application of representative INM aircraft types using a substitutions list for those types where noise data is not included within the model.
- Validation of the noise modelling predictions by comparison of the predicted noise levels of individual movements with those actually measured by the fixed Noise Monitoring Terminals (NMTs). The most common aircraft types are used to ensure sufficient data for robust validation.
- Running of the contour model from an INM input, following application of the validation results to the summarised actual movements and the split of activity by route.

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 within 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 TAG 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, January – December 2013

- 2.5 The predicted contours for the period January to December 2013 have been generated using 2012 actual movement data (flight tracks and aircraft mix) with the assumption that there will be a total of 23,017 movements over the course of 2013.

3 RESULTS

- 3.1 The INM 7.0c contours produced for January to December 2012 are shown together with the Rushmoor Borough Council 1997 Planning Contours in Figure 1. Predicted contours for 2013 are shown in Figure 2. Both contours allow for helicopter movements which are assumed to show an increase in line with fixed wing movements between 2012 and 2013. 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 January to December 2012 are within the planning permission control contour areas, as amended under clause 12.1a of the planning agreement.
 - The predicted contour areas for January to December 2013 are also within the planning permission control contour areas, as amended under clause 12.1a 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 Rushmoor Borough Council were theoretical in that they used conceptual aircraft movement routes. 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.

- 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 predictions have been validated by comparison of INM predicted noise levels for individual aircraft movements against measured noise levels at the Airport's Noise Monitoring Terminals (NMTs). This has shown, as with the exercise reported at the Public Inquiry in 2010, that some of the INM standard aircraft substitutions used older aircraft types which over estimated the noise levels of the more modern types operating. Consequently the standard substitutions have been revised; this is recorded in the list in Appendix 1.

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 12.1a 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 – Dec 2012 and Predicted Jan - Dec 2013

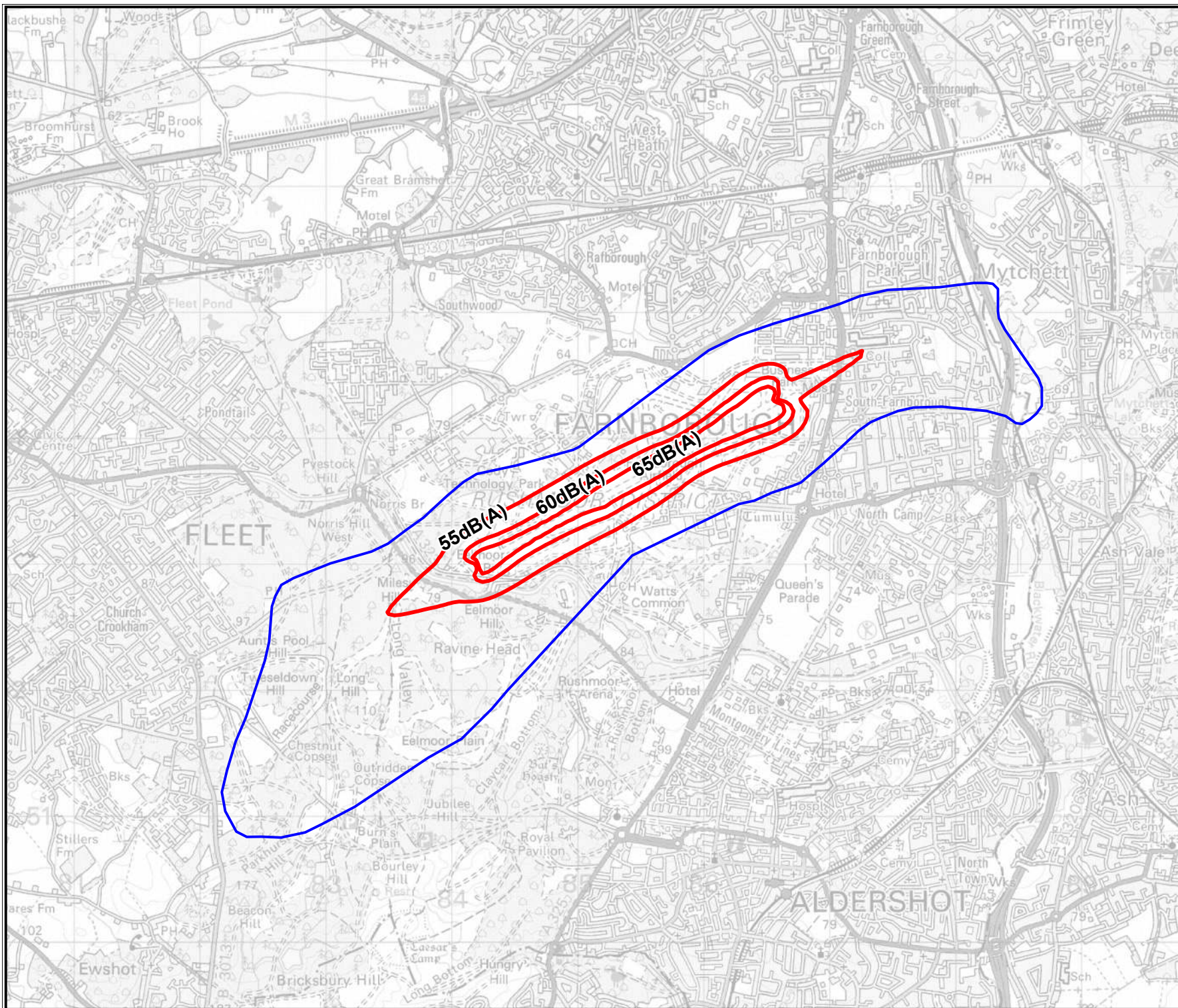
dB(A) L _{Aeq,16h}	Actual contour areas January to December 2012 (km ²) (based on 23,017 actual movements)	Predicted contour areas, January to December 2013 (km ²) (based on 23,017 movements Jan – Dec 2012 fleet mix)
55	1.89	1.89
60	0.86	0.86
65	0.41	0.41

4. CONCLUSION

- 4.1 Contours produced for the year 2012 and the predicted contours for the year 2013 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, the allowance for the steeper approaches used, and the findings of the validation exercise.

Miles H Thomas
Environment Manager
08/02/2013

TAG Farnborough Airport
www.tagfarnborough.com



Key:

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

Revisions


TAG Farnborough Airport Ltd
Farnborough
Hampshire
GU14 6XA

© Crown copyright. All rights reserved
 Based upon Ordnance Survey 1:50 000 mapping
 Licence Number: 1000 36221

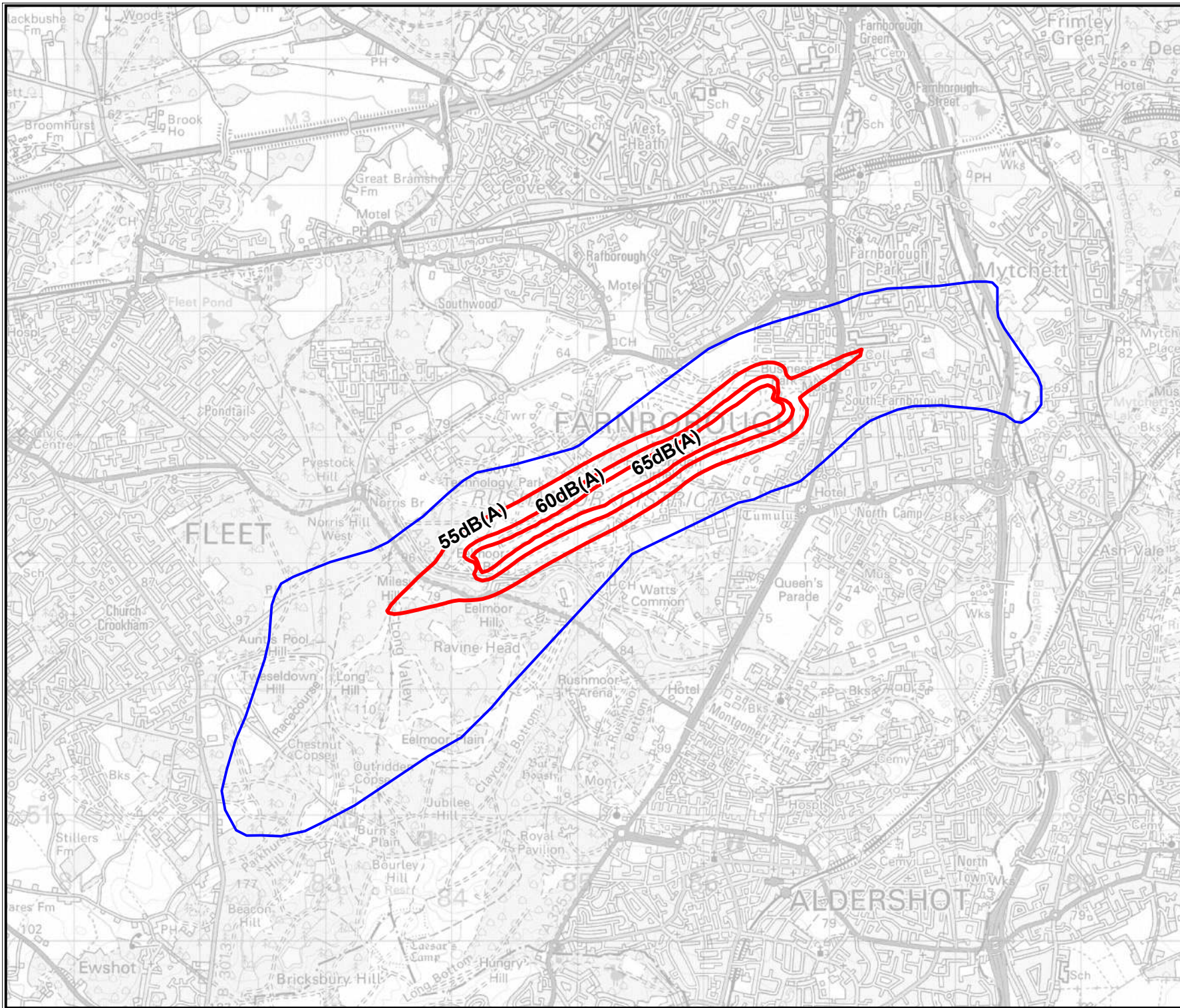
Scale@A4 1:40 000	Date 07/02/13	Drawn by SG
----------------------	------------------	----------------

Title

Figure 1:
Airport Noise Contours
All 2012

Drawing No. GN TG A OP 2195	Rev No. A
---------------------------------------	---------------------

File



Key:

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

Revisions


TAG Farnborough Airport Ltd
Farnborough
Hampshire
GU14 6XA

© Crown copyright. All rights reserved
 Based upon Ordnance Survey 1:50 000 mapping
 Licence Number: 1000 36221

Scale@A4 1:40 000	Date 07/02/13	Drawn by SG
----------------------	------------------	----------------

Title

Figure 2:
Airport Noise Contours
All 2013 Predictive Contours

Drawing No. GN TG A OP 2196	Rev No. A
---------------------------------------	---------------------

File

Appendix 1

INM 7.0c 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 were created to reflect the steeper approaches undertaken at Farnborough.

Operational Aircraft Code	INM Aircraft Code / Substitution Code
A318	A319-131
A319	A319-131
A320	A320-232
A321	A321-232
AC11	GASEPF
AC95	CNA441
AEST	BEC58P
ASTR	IA1125
AT01	GASEPF
AT72	DO328
B190	1900D
B350	CNA441
B461	BAE146
B462	BAE146
B463	BAE300
B721	727100
B732	737D17
B733	737300
B734	737400
B735	737500
B737	737700
B738	737800
B739	737800
BD70	GV
BDOG	CNA206
BE20	CNA441
BE30	DO228
BE33	GASEPV
BE35	BEC58P
BE36	BEC58P
BE40	MU3001
BE55	BEC58P
BE58	BEC58P
BE76	BEC58P
BE90	CNA441
BE9L	CNA441
BE9T	CNA441
BN2T	BEC58P
C130	C130
C150	CNA172
C172	CNA172
C180	CNA206
C182	CNA182
C185	CNA206
C206	CNA206
C208	CNA206
C25A	CNA525C
C25B	CNA525C
C25C	CNA525C

Operational Aircraft Code	INM Aircraft Code / Substitution Code
C295	HS748A
C303	BEC58P
C310	BEC58P
C340	BEC58P
C401	BEC58P
C402	BEC58P
C421	BEC58P
C441	CNA441
C500	CNA500
C501	CNA500
C510	MU3001/CNA510
C525	CNA525C
C550	CNA500/EMB145
C551	CNA500
C560	MU3001
C56X	CNA560XL
C650	CIT3
C680	CNA680
C750	CNA750
CAMP	GASEPF
CH7B	GASEPF
CL30	CL601
CL60	CL600/CNA601
CRJ1	CL601
CRJ2	CL601
CRJ7	CRJ9-ER
CRJ9	CRJ9-ER
D228	DO228
D328	DO328
DA40	GASEPV
DA42	BEC58P
DC93	DC930
DH8C	SD330/DHC6
DH8D	SD330/DHC6
DHC1	GASEPF
DHC6	DHC6
DH89	BEC58P
E120	EMB120
E121	DHC6
E135	EMB145
E145	EMB145
E170	737500
E190	A319-131
E400	CNA20T
E50P	CNA510
E55P	CNA510
EA50	ECLIPSE500
EUFI	HAWK
EUPA	GASEPF

Operational Aircraft Code	INM Aircraft Code / Substitution Code
F100	F10065
F2TH	CL600
F406	CNA441
F50	CVR580
F900	F10062
FA10	LEAR35
FA20	FAL20
FA50	F10062
FA7X	F10062
G115	GASEPF
G150	IA1125
G550	GV
GA7	BEC58P
GALX	CNA750
GL5T	GV
GLEX	GV/F10062
GLF3	GIIB
GLF4	GIV/CNA55B
GLF5	GV/CNA55B
GYRO	GASEPF
H25A	LEAR35
H25B	LEAR35/CNA55B
H25C	LEAR35
H25D	LEAR35
HA4T	CL600
HR20	GASEPF
J328	CL600
JS31	DO228
JS41	SF340
LJ31	LEAR35
LJ35	LEAR35
LJ40	LEAR35
LJ45	LEAR35/GIV
LJ55	LEAR35
LJ60	CNA55B
MD82	MD82
MD83	MD83
MD87	MD81
P06T	CNA441
P180	SD330
P28A	PA28
P46T	GASEPV
PA28	PA28
PA31	PA31
PA32	GASEPV
PAY2	CNA441
PAY3	PA42
PAY4	PA42
PC12	CNA208

Operational Aircraft Code	INM Aircraft Code / Substitution Code
PRM1	LEAR35
RJ70	BAE146
RJ85	BAE146
SBR1	LEAR25
SB20	HS748A
SF34	SF340
SPIT	BEC58P
SR20	GASEPV
SR22	GASEPV
SW4	DHC6
TBM7	CNA208
TBM8	CNA208
TRIN	GASEPV
YK42	727EM1

Helicopters

A109	A109
A139	SA330J
A159	S76
AS350	SA350D
AS355	SA355F
AS365	SA365N
B06	B206L
B407	B407
B430	B430
EC15	A109
EC20	A109
EC30	EC130
EC35	A109
EC55	SA365N
EXPL	B222
H500	H500D
H60	S70
H64	S70
R44	R44
S76	S76
S92	S65